DISCUSSION PAPER / 2010.02

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The new territorial paradigm of rural development: Theoretical foundations from systems and institutional theories

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Abstract

In recent decades, a new paradigm for public policies in rural areas has made headway. This new approach aims to support economic and institutional transformation processes designed and implemented by local rural actors themselves. It argues for the building of local partnerships as a tool for the governance of rural change.

This paper reflects about the governance of development and change in rural areas. It builds a conceptual framework from two complementary theoretical sources: (a) complexity theory views on the governance of resilience and (b) institutional theories. Given the impossibility to predict and plan social change in a top-down fashion, it stresses that change requires that actors of a social system construct a sufficiently shared vision of a desired future state and manage to act together in order to 'navigate' the pathway towards that aim. Capacity for territorial governance is also critical in rural governance of resilience. System resilience refers to the capacity of actors to adjust the desired pathway whenever external shocks threaten its viability, or in certain cases, impose the need for a more fundamental change in the prevailing system and the desired pathways of change.

We argue that these theoretical inspirations provide a useful substantiated underpinning for the territorial paradigm of rural development and allow us to show why and how the local partnership has the potential to improve the governance and the resilience of rural territories. We also develop a number of further reflections about the challenges of such partnerships, in particular the difficulties emerging from heterogeneous interest and power of local actors.

Résumé

Ces dernières décennies, on a assisté à la progression d'un nouveau paradigme en matière de politiques publiques dans les zones rurales. Cette nouvelle approche vise à soutenir les processus de transformation économique et institutionnelle conçus et mis en œuvre par les acteurs ruraux eux-mêmes. Ce paradigme propose des partenariats locaux comme instrument de gestion du changement rural.

Le présent essai propose une réflexion sur la gestion du développement et du changement dans les zones rurales. Il élabore un cadre conceptuel à partir de deux perspectives théoriques complémentaires : une perspective sur la gestion de la résilience basée sur la théorie de la complexité, et une perspective institutionnelle. Devant l'impossibilité de prévoir ou de planifier le changement social, cela exige que les acteurs d'un système social construisent une vision suffisamment partagée d'un futur état désiré, et qu'ils parviennent à agir ensemble en vue de définir et de parcourir le chemin qui mène à cet état. La capacité de se doter d'une gouvernance territoriale est un aspect critique de la gestion rurale de la résilience. La résilience du système désigne la capacité des acteurs à adapter ce chemin lorsqu'interviennent des facteurs extérieurs qui menacent sa viabilité, voire même, dans certains cas, de réinventer tout le système et redéfinir le chemin qui mène au changement.

Nous considérons que ces réflexions proposent des fondements théoriques utiles et étayés pour expliquer le paradigme territorial du développement rural et qu'elles nous permettent de montrer pourquoi et comment le partenariat local est un instrument qui a le potentiel d'améliorer la gouvernance et la résilience des territoires ruraux. Nous menons également des réflexions sur les défis que rencontrent ces partenariats, en particulier sur les difficultés occasionnées par l'hétérogénéité des intérêts et du pouvoir parmi les acteurs ruraux.

Resumen

En las últimas décadas ha ganado terreno un nuevo paradigma de políticas públicas para las zonas rurales. Este nuevo enfoque aboga por el apoyo a procesos de transformación económica e institucional diseñados e impulsados por los propios actores rurales. Este paradigma propone un partenariado local como instrumento de gestión del cambio rural.

En el presente ensayo se ofrece una reflexión sobre la gestión del desarrollo y del cambio en las zonas rurales. Se elabora un marco conceptual a partir de dos perspectivas teóricas complementarias: una perspectiva sobre la gestión de la resiliencia desde la complejidad y una perspectiva institucionalista. Ante la imposibilidad de prever o planificar la ocurrencia del cambio social, éste requiere que los actores de un sistema social construyan una visión suficientemente compartida de un estado futuro deseado del mismo y "naveguen" la senda para alcanzarlo. La capacidad para dotarse de una gobernanza territorial es un aspecto crítico de la gestión de la resiliencia. La resiliencia del sistema se refiere a la capacidad de los actores para adaptar esa senda cuando existan factores que amenacen su viabilidad o, llegado el caso, para incluso reinvertar el propio sistema y redefinir la senda.

Consideramos que estas reflexiones ofrecen fundamentos teóricos sustantivos para explicar el paradigma territorial del desarrollo rural y nos permiten mostrar por qué y cómo el partenariado local es un instrumento con potencial para mejorar la gobernanza y la resiliencia de los territorios rurales. También reflexionamos sobre los retos de dichos partenariados, en especial, las dificultades provocadas por la heterogeneidad de intereses y poder en los actores rurales.

1. Introduction

Agriculture and rural development are two basic pillars in the fight against rural poverty and for the enhancement of food security. Agricultural activities determine the livelihoods of most of the poor all over the world. In Sub-Saharan Africa, agriculture provides 65% of the employment opportunities for the labour force and accounts for up to 32% of GDP (World Bank, 2007). But primary sector activities are not the only source of employment and incomes for the rural population (De Ferranti et al., 2005). The rural economy is shaped by multiple activities that reflect the diversity of livelihoods of the rural population, especially of the rural poor. These rural off-farm activities can be decisive to fight rural poverty.

During the last fifty years, different topics have been proposed as policy priorities for the development of rural areas. These shifting priorities also reflect how different academic disciplines have successively prevailed to inform rural policy making. Concepts and methodologies to assess and manage rural change have shifted from technological, managerial and centralized approaches to more constructionist, participatory and decentralized perspectives of rural change (Ellis and Biggs, 2001). Present-day research agendas on rural areas emphasize systemic rather than analytical approaches. Social, economic and institutional issues are integrated and functional interrelations among the elements of the system as well as spatial and temporal historical considerations are highlighted (Cairol et al., 2005; RIMISP, 2007). Other fields of study have started to explore similar systemic approaches, such as landscape management (Bai-Lian, 2000; Naveh, 2001).

From a development perspective, not only considerations on the evolution of the rural areas are relevant, but also the approaches for delivering aid have become increasingly important. In 2005, the donor community endorsed the principles of aid effectiveness (OECD, 2005). New instruments and programming frameworks to manage aid (SWAPs, budgetary support, PRSPs, MTEF) have gained pride of place in development practice. As a consequence, policies and strategies to fight poverty in principle have to be country-owned and context-specific. But central governments in poor countries are usually limited to reach subnational administrative levels. New agreements on aid effectiveness (OECD, 2008) therefore encourage the transfer of policy and executive responsibilities to the local level. Thereby it is ensured that policies and strategies become more location-specific.

The territorial approach to rural development may help to implement sector strategies and to attain the goals of aid effectiveness. This approach to rural policy formulation and implementation promotes joint-action among rural agents, coordination between the different administrative levels of government and articulation among different sector policies addressing the problems of rural areas (agriculture, education, health, infrastructure, employment). Such a policy approach could contribute to shape a 'new generation' of public policies for fighting poverty in rural areas.

The main purpose of this paper is to contribute to the construction of a conceptual framework that supports this territorial or place-based approach to rural policy (OECD, 2006). The framework provides a comprehensive and systemic understanding of the dynamics occurring

within rural territories. We suggest an approach that integrates two complementary perspectives: on the one hand, an institutional perspective which deals with social interactions among agents and the rules that govern these interactions, and on the other hand, a complexity theory perspective that provides the structural components for a dynamic, multi-level perspective with which to assess only partially predictable change processes in social systems. While during the last two decades a lot of work has already been done from an institutionalist perspective, the latter perspective is relatively new within development studies but offers quite promising prospects for the field (Warner, 2001; Osbahr and Martin, 2007; Fowler, 2008; Ramalingam et al., 2008).

This paper is primarily intended for researchers interested in the theoretical underpinning for this policy approach to rural development. Given that the paper is exploratory in nature, comments and critiques are welcome to make further progress on the theoretical discussion. As theory informs our action, an improved understanding should lead to a better and possibly more modest and realistic design and management of those development interventions which try to foster processes of beneficial rural change. Hopefully, policy-makers and development practitioners concerned with fighting rural poverty will find some inspiring metaphors and reflections to help them tackle this complex task.

The paper is divided into five sections corresponding to the fundamental issues of the proposal: the policy approach, the object of intervention, time and space considerations, and the role of human and social agents. The first section introduces the main elements of the territorial policy approach. Second, the epistemology of complexity is explained and applied to the 'rural territory' as an object of intervention acknowledging it to be a geographically-rooted and open social system. In the third section, time considerations are taken into account in order to outline a framework on the logic of change in social systems. The contributions of North (1990) and Holling (2001) are fundamental here. In the following section, issues regarding scales and vertical interplays are presented and the idea of 'panarchy' (Holling and Gunderson, 2001) is introduced to join both dynamic and multi-scalar issues in social systems. The fifth section deals with the influence of the human agency component in the governance of rural systems and their reproduction. Finally, some reflections are presented, linking the main elements of the policy approach and the corresponding theoretical justification.

2. Policy: a renewed approach to rural development

From a geographical perspective, economic growth is often based upon economies of scale and agglomeration in certain regions and cities. Those areas that fail to aggregate enough employment and income opportunities lag behind. In this respect rural areas suffer from multiple economic and political disadvantages. Indicators of social and economic performance in rural areas typically fall under the national averages in most countries. While in developing countries the deprived areas, especially rural areas, suffer from the most extreme poverty conditions, in developed countries these areas challenge territorial cohesion (Faludi, 2006). Traditional sector policies and market mechanisms have failed to address the regional imbalances.

Today, changes in the national and international context are shaping a new scenario in which rural policies gain prominence. Firstly, environmental issues imply special consideration of the sustainable exploitation of natural resources. As a consequence, externalities of agriculture in terms of land and water use, biodiversity and forestry ask for much more attention (e.g. Van Hecken & Bastiaensen, 2009). Secondly, the outcomes of international trade negotiations determine and usually restrict the number and nature of policy options for agriculture. In order to be able to maintain public support for agriculture activity, new perspectives are therefore called for. As highlighted in the 'multifunctionality' paradigm, food security, rural employment, production of rural landscape and conservation of the rural heritage and traditions are increasingly recognized as important non-commodity outputs of agriculture in this respect (Maier and Shobayashi, 2001; Massot Martí, 2002). Finally, decentralization and deconcentration enable local actors to engage in the definition of priorities and the use of resources to tackle regional inequalities (OECD, 2006). However, this changing environment seems to have reinforced local actors' perceptions that the decisions affecting their livelihoods are increasingly out of their hands (Entrena Durán, 1999).

2.1. The new rural paradigm in developed countries

As we indicated in the introduction, there has been a paradigm shift in rural policies of developed countries in the last twenty years. Rural out-migration, in particular the out-flow of jobless young people, the aging of the population, a general decline of agricultural activities and a productivity fall of rural labour force are the dominant outcomes of widely prevailing rural conditions (OECD, 2006). Facing this context, the new approach to rural development aims to generate processes of profound structural change in rural territories (Delgado, 2004). At its core is the conviction of the necessity to give greater prominence to local agents in driving the social, economic and political changes in the territory.

At the centre of this new paradigm lies a comprehensive and integrated view of all those elements that constitute a rural territory. This concept of 'territory'**[1]** resembles, but goes beyond the idea of 'community' as defined by IFAD (2009): a "locus where all members of a group of people, having some form of collective claim over a territory and recognizing some form of collective governance, can be given the opportunity to influence decisions in matters of

[1] For a review on the origins of this approach, see Bassett et al. (2007)

public choice that affect their livelihood". An essential idea of the territorial approach is the key role in rural governance for what people perceive as common limitations and opportunities for improving their livelihoods. These perceptions condition their perceived set of opportunities and feasible alternatives for change, i.e. their vision for a possible and desired future. A territory has no pre-defined boundaries, neither administrative nor physical, but stems from the aggregation of groups of people with similar problems and opportunities. In this sense, a territory might correspond to a watershed, a set of coastal communities or various municipalities from different departments sharing similar agro-ecological conditions. A territory refers to a system that integrates a diversity of endogenous resources and their interrelations. Every single element of the territory thereby becomes a potential trigger for structural change. Rural territory is no longer defined as a physical support for human activities but as an actor by itself, a living organism formed by interacting cells (individuals, households, CBOs, tangible assets). From this systemic perspective, and within the relevant structural change processes encouraged by this policy approach, two territorial processes along with a series of 'crosscutting' issues can be identified.

2.2 The territorial processes

2.2.1 Productive transformation

The possibilities of agrarian policies to improve the living standards in rural areas, and especially of the non-farmers, are low and even insignificant (OECD, 2006). The rural population as a whole and its economic activities, whether agriculture-related or not, are to be clearly incorporated into the rural policy. The intended productive transformation will provide employment and income opportunities not only to farms but also to other rural actors, such as female entrepreneurs (Cruces Roldán and Palenzuela Chamorro, 2006) or immigrants (Kalantaridis and Bika, 2006). The driving forces behind this transformation include the exploitation of local resources, in its broadest sense; the promotion of demand for territorial commodities and non-commodities, and the better exploitation of linkages between rural and urban areas.

In the context of developed countries, policy proposals aim at a broad transformation, including at least four critical policy areas: development of transport and ICT infrastructure, delivery of public services, valorisation of rural amenities and promotion of rural enterprises (OECD, 2006). Among the rural economic activities, tourism has received special attention, given its potential to regenerate rural areas (Morán Rodríguez, 2002), to articulate investments by private-, public- and voluntary-sector altogether (Garrod et al., 2006) and to help farmers complement their incomes (Ciruela Lorenzo, 2008).

Economic diversification has been considered a fundamental step forward towards the upgrading of agriculture production systems (Evans, 2009). In off-farm activities, farmers find an alternative to complement their incomes, in spite of the difficulties to carry out such a strategic shift (Meert et al., 2005). The sustainable exploitation of natural resources becomes a well-known alternative for rural transformation, be it either through extraction or leisure activities (Courtney et al., 2006) or by putting a value to ecological sustainability (Warner, 2007). Other non-agricultural activities should provide new sources of local employment. Manufacturing can offer an alternative, be it through local industries (Méndez et al., 2005) or access to new value-chains (Alonso Logroño and Rodríguez González, 2005).

Public intervention has a role to play too. For instance, product certification can be required to cover legislative gaps on protecting and regulating the use of local resources (Sanz Cañada and Macías Vázquez, 2005; Overton and Heitger, 2008). Offering business services to entrepreneurs could be another policy priority; in this case, context-specific issues have to be considered in order to respond properly to local demands (Skuras et al., 2005).

The new rural paradigm also counts on non-commodities such as landscape, natural heritage, environment and culture as important potential sources for rural economic transformation (Knickel and Renting, 2000; Hilpert, 2006; Fløysand and Jakobsen, 2007; Warner, 2007). Within the EU context, social demand and willingness to pay for such goods and services justify public policy support to agriculture, as long as they are joint-outputs of the agriculture activity (Gómez-Limón et al., 2007). It is recognized that this support should not be limited to agriculture but also cover other economic activities that generate joint-outputs (Mann and Wüstemann, 2008). However, in spite of the strong political support received from the EU institutions, the implementation of the 'multifuncionality paradigm' has so far been quite limited (Cairol et al., 2005; Johnson et al., 2008). There are some experiences at the national level (Marsden and Sonnino, 2008), the '*Contrats Territoriaux d'Exploitation*' in France (Torre, 2000; Rémy et al., 2002; Velasco and Moyano, 2006) and the recently created '*Contratos Territoriales de Zona Rural*'[1] in Spain.

2.2.2 Institutional transformation

The second territorial process is referred to as institutional transformation. It pursues transformations at the level of the central administration, at the local level and in the vertical interplays between them (OECD, 2006). According to this multi-level shift, the local agents are expected to impel and drive any change in their territory. Three drivers help understand this institutional shift.

On the one hand, decentralization has consolidated the transfer of competences to subnational administrations (regional, local authorities) and led to an increase of territorial autonomy and the generation of new spaces for policy-making (Ramírez Pérez et al., 2007). Yet the territorial approach should not serve as an alibi to argue the case for transferring the provision of public goods to sub-national public administration, even less to local governments. Even though outsourcing delivery has become an alternative, such as in case of the 'Development Trusts' in UK (Clark et al., 2007; Zografos, 2007; Di Domenico et al., 2009) or 'social enterprises' (Mozas Moral and Bernal Jurado, 2006; Berkes and Davidson-Hunt, 2007), the limited taxing base and high costs for delivering public services continues to justify the financial and managerial support required from central administration (OECD, 2006). In some cases this support from the central administration is inevitable, such as when regulation and oversight mechanisms are required on territorial issues (Mutersbaugh, 2005). The territorial approach does not remove the need for either centralised administration or sector policies, but rather makes both of them more evident (Murdoch and Abram, 1998).

Among the territorial actors, local government plays a key role (Welch, 2002; Doug-

[1] According to the Spanish Law 45/2007 for the Sustainable Development of Rural Areas (December 13th).

las, 2005). Local authorities usually demand greater responsibilities and resources to carry out territorial policies, not only economic but also health, education, infrastructure or taxation-related (Pearce et al., 2005). The increase of local autonomy is attached to a broader responsibility in the effective delivery of services. The search for effectiveness drives the constitution of 'critical masses' among municipalities, in order to generate economies of scale and to exploit them (OECD, 2006). This is the rationale behind the proliferation of 'etablissements publics de cooperation intercommunale' in France (Ojeda García, 2008) or of the 'mancomunidades' in Spain as part of the decentralization process. Even though these municipal associations are considered to be appropriate institutional formulas in order to assimilate and manage demands and goals from their constituencies (Riera et al., 2005), this does not prevent resistance to such amalgamation of municipalities during their creation and consolidation (Hall and Stern, 2009).

Finally, a larger engagement of other local actors is taking place by means of participation and shared decision-making, as a way of actively engaging the rural population in the transformation of their territory. In this way, a greater interdependence and interrelation among local actors emerges. In more consolidated experiences it may even lead to cooperation with agents from other countries (Ray, 2001). Mechanisms to ensure effective coordination are thus required. An effective co-ordination among local institutions and organizations (horizontal co-ordination) and active involvement of population in the process of decision-making and implementation are critical. At the same time, the necessary access to external opportunities and resources (i.e. demand, information, decision-making process that influence the territory) calls for attention on the interplays with exogenous agents (public, private, other partnerships). Enhancing agency ability of local actors often requires coalitions and interplays with these outside agents (vertical co-ordination). Vertical interplays are also relevant for dealing with issues that go beyond the territorial boundaries or that happen at a larger scale before impacting on the territory. Frequently, it is assumed that these issues remain limited to environmental concerns (Berkes, 2007a) but also the management of pan-territorial infrastructures and economic spillovers or collective action to provide public services entails such vertical interplays.

2.2.3 Crosscutting issues

Finally, a third type of territorial process relating to crosscutting issues of both productive and institutional processes can be captured under three guiding ideas: (a) innovation; (b) integrative and multi-sector approach; and (c) territorial competitiveness.

The need for innovation occupies a central place in the territorial approach. Among the productive and/or institutional initiatives undertaken by local agents, those containing a high degree of positive innovation within the territorial context must be heavily supported, since rural development will not be forthcoming without radical and profound change in activities and mode of co-operation. Such responses must show coherence with the agreed goals, strategies and ongoing interventions, while encouraging integrative linkages among local agents and resources.

These linkages should reflect the whole range of activities and actors in a rural area shaping its development path, beyond those connected to the primary sector. The institutional architecture fostered by this approach aims to bring together individuals with diverging or even contradictory interests, but holding a potential to attain yielding interactions. The integrative

and multi-sector nature of these linkages would not only come out from integrating different activities (entrepreneurship, education, health, infrastructures, governance, environment) into every single intervention. It mainly involves the engagement of local actors from different institutional spheres (private, public, voluntary) into joint-actions.

Finally, productive transformation cannot be at the expense of either the depletion of natural resources or an increasing precariousness of the local population assets. Territorial competitiveness (Farrel et al., 1999) calls for local entrepreneurs who are able to compete in the market or to insert themselves into supra-local value-chains while ensuring environmental and social sustainability (Sanz Cañada and Macías Vázquez, 2005; Gallego Bono, 2009).

2.3 The policy instrument

This new rural policy emphasizes changes in governance, above all at the local level. As a common feature of the policy experiences, this approach encourages the generation of a common perception among the rural inhabitants of the problems, opportunities and desired futures for the territory. This cognitive synergy becomes the key issue on the 'ascendant' or bottom-up social construction of the territory, far from bureaucratic and 'top-down' definitions of territorial boundaries. There is thus a need for a mechanism to help local agents articulate and exchange their views and, based on their expectations, build strategies to carry out the productive and institutional transformations.

The privileged instrument to offer this joint-space is a 'partnership', defined as a "system of formalised co-operation, grounded in legally binding arrangements or in formal undertakings, cooperative working relationships and mutually adopted plans among a number of institutions" (OECD, 2006). This partnership becomes a bedrock for the territorial approach, as it establishes the boundaries of the territory according to the collective claim made by the stakeholders. Basically, the partnership must identify the challenges facing the territory, trace a set of desirable goals and changes and define what kind of local responses are to be supported with financial incentives. The stakeholders also agree on how responsibilities, costs and benefits are to be shared among them.

The LEADER initiative by the EU has provided one of the significant experiences in this respect (see box). Other examples of this instrument can be found in the 'Grupos de Desarrollo Rural' of the PRODER Program in Spain (Plaza Gutiérrez, 2005), the Local Strategic Partnership in the UK (Bailey, 2003) or the County Enterprise Boards in Ireland (Moseley et al., 2001).

LEADER: a territorial policy approach to rural development

Among the multiple experiences associated to the territorial approach for rural development, the LEADER initiative of the European Union represents one of the better-known and widely studied programmes. Between 1991 and 2006, the LEADER initiative was implemented in three phases (LEADER, LEADER II and LEADER+), showing a fast territorial expansion across both leading and lagging rural areas in the EU.

The 'LEADER method' stood for one of the main features of this program. This method underscored the co-operation across and within public administrations and the private sector, achieving remarkable impact on the governance of the rural areas. Three elements shaped this method: a territory or LEADER area; an integrative development strategy based on an endogenous approach and innovative actions; and a local action group (LAG) characterised by decentralised financing, co-operation and public-private partnerships. The governance of the program consisted of a "complex multi-tier administrative scheme", which engaged administrative units at different levels (European Commission, ministries, regional governments, LAGs and private and institutional entrepreneurs at the local level) in the definition, implementation, financing and evaluation of the initiative.

As main factors for their success accounted its innovative character, though it was inspired by previous experiences in some advanced EU countries, and the achieved results in many rural areas despite the relatively limited budget. Ex-post evaluations of the initiative (ÖIR, 2003) highlighted some success factors of this approach; among others: ability to close the gap between a top-down programme and local needs and aspirations; adaptability to every rural socio-economic and governance context, showing responsiveness to small-scale activities and projects and fostering new avenues for creating added value or synergies between existing value chains; capacity to bring local actors, administrations and support structures closer together, by conveying responsibility to local partnerships; ability to mobilize additional efforts of committed local actors.

SOURCE: Elaborated from OECD (2006: 90-94).

Even when no universal normative value should be attributed to particular types of arrangement (Cleaver, 2002), a set of conditions must be met so that the constitutional and operational rules of the partnership are both coherent with and functional to the desired rural structural transformations.

First of all, it needs to be recognised that the core of the proposed partnership is based upon a discursive creation, shaped by the sufficiently shared perceptions and aspirations of the local actors and represented by the metaphor of the territory[1]. This definition of the territory offers the social construction that should turn into the bedrock of joint action for structural change (Ray, 1999), in this way also guaranteeing the ever-changing reproduction of the discursive reality of the 'territory'.

For the discursive reality of the 'territory' to be functional within this new rural planning approach, criteria in at least three critical dimensions need to be met. A territory needs to comprise a minimum threshold of agents and population in order to achieve a certain 'critical mass', a representative subset of the local human capital (quantitative dimension). It is held to be advantageous when the territory is relatively homogeneous, i.e. that it shows a considerable degree of uniformity in terms of economic structure, geography, natural resources and history (qualitative dimension). This makes it easier to shape and manage a coherent development path for the territory. Finally, the territory should also exhibit a sufficient degree of territorial identity (cohesion), i.e. a shared sense of belonging should prevail among the population.

[1] Thereby the term territorial (or place-based) rural development, in opposition to other 'rural development' approaches, which can work with a multiplicity of factors but without including the territory as a cognitive synergy.

This institutional structure for territorial governance is however not exempt from criticism. The most frequent concern affects its suitability for generating 'cognitive synergy' on the territory. The partnerships should recognize and provide sensitivity to the multiple discourses of the various interest groups in the territory (Paniagua, 2009). This is aimed at assimilating excluded collectivities into the processes of decision-making and discursive creation about the territory. In this regard, a first critique addresses the idea of the participation in terms of assessing who is to be considered excluded, why non-participation entails exclusion and what benefits are to be expected from participation (Shortall, 2008). Partnerships are criticized as they tend to become elitist and neo-corporativist spaces, lacking in capacity to effectively engage both excluded groups and those economic actors that have a key impact on the local economy (Geddes, 2000). An additional issue refers to the political character of these new arenas, even when the local actors themselves might not recognize this as a critical issue for community participation (Edwards, 1998). From a political point-of-view, asset endowment and network connections impacts the relative power of actors involved in the negotiated re-elaboration of the rural discourse. There are evidences of the influence exerted by local elites (Brunori and Rossi, 2007) and through the culture of patron-client relationships (Wassenhoven, 2008). Moreover, this political dimension of the partnership makes the legitimacy of the discourse more reliant on the representativity of the stakeholders than on their deliberations (Connelly et al., 2006). Nevertheless, it should also be considered that such negotiation power is dynamic and greatly depends on the kind of interplay at stake and the sort of assets required to 'win' in the negotiation (Derkzen et al., 2008). Despite these criticisms, empirical studies show that local agents can also change their perception about the implications of these partnerships for the rural territory as they consolidate. This change is especially remarkable in local governments. From being considered a mere tool to obtain financial resources for local projects, these organizations become a development instrument for which new competences are demanded (Esparcia et al., 2000).

2.4 Rural development in development studies and practice

From the perspective of the development agenda, agriculture and rural development are key issues for the fight against poverty. In developing countries, 75% of the poorest live in rural areas and agriculture provides most of the employment opportunities for the poorest (World Bank, 2007). Shortcomings in the access to basic services (water and sanitation, education, health) have the greatest impact on rural populations (World Bank, 2003). The rural challenges remain and in some cases have even worsened. Global crises (food, fuel and financial) have jeopardized progress towards achieving the MDG, among other sources, by increasing the prices of goods that stand for over 50% of the poorest households' expenses, bringing down the export commodities from the LDC and reducing remittances flows to LDC (World Bank, 2009). This situation however has not given rise to a significant increase in funding from donors yet, but to the creation of new financial instruments (global facilities) that address the lack of liquidity in the poor countries as a consequence of the global financial crisis (G20, 2009). Nevertheless, this response should go beyond the present crisis situation.

While rural areas in general and agriculture in particular have substantially decreased in importance on the priority list of donors in the 1990s, a renewed interest has emerged during the last decade. Partnerships have been launched to enhance donors' coordination (the Inter-Agency Group on Rural Development in 2000 and the Global Donor Platform for Rural Development in 2004) and efforts have been undertaken to build a joint understanding of the

main rural challenges in developing countries (GDPRD, 2006). Agriculture, rural dynamics and economic geography have also returned to the last issues of the World Development Report (World Bank, 2007; World Bank, 2008).

Indeed, the policy agenda for fighting rural poverty has evolved over the last fifty years. The priority focus has shifted from technologically upgrading the agriculture sector, through the in-depth reduction of the presence of public agencies, liberalisation and de-regulation of agrarian markets, to the promotion of off-farm economic activities as complementary sources of income, the re-building of public institutionality, including support to local governments and the emergence of new arenas for decision-making (Ellis and Biggs, 2001). New topics have gained pride of place in this agenda over the past years such as food availability and immigrant remittances' impact on the livelihoods of rural households. Value-chains insertion and environmental services open new sources of employment and income opportunities for rural economic agents. From a broader perspective, growth is back on the agenda. Besides macroeconomic stability and considerations on investment and financing, regional development and the political economy of change are also topics at stake (Commission on Growth and Development, 2008). While the former issue deals with all the evidences on the increase of regional disparities between rich and 'lagging' areas, the latter stems from the institutionalist wave of the last two decades. They bring into discussion the need to improve the effectiveness of sector policies in poor areas, especially in countries with significant market failures.

The idea of perceiving development from the perspective of the territory can significantly contribute to the goal of delivering more effective public policies for rural development (De Ferranti et al., 2005). One of the main implications is that governance issues have become bedrocks in any development intervention at central and above all at local levels. The support for decentralization and participative approaches in developing countries assumes that local organizations and actors have a better knowledge of the local potentiality and constraints. Policy effectiveness may largely benefit from their engagement in the policy cycle (design, implementation, monitoring and evaluation).

Developing countries have already gained an all-embracing experience in supporting community-driven priorities (Korf and Oughton, 2006). For example, a large proportion of 'social funds' projects carried out by multilateral institutions and development organizations have followed the so-called 'community-based' or 'community-driven' approaches (Mayo, 1958; Summers, 1986; Dahl-Østergaard, 2003; Mansuri and Rao, 2004). Partly based on these approaches and the evidence from the theoretical and strategic shifts observed in rural development interventions (Berdegué et al., 2003; Richards, 2004; Schmitt and Benasayag, 2006), the discourse on rural policy in Latin America is being reelaborated since about a decade ago (Pérez Correa, 2001; Sepúlveda et al., 2003; Romero Rodríguez and Ferrero, 2004; Schejtman and Berdegué, 2004; Benedetto, 2006; Llambí Insua and Pérez Correa, 2007; Kay, 2008). In this Latin American perspective, the territorial approach not only aims at reducing regional inequalities or stirring economic or institutional transformations in rural areas. The fight against poverty is set at the centre stage, thereby broadening the rural policy agenda that prevails in developed countries (Echeverri Perico and Ribero, 2002; De Janvry and Sadoulet, 2004; Schejtman and Berdegué, 2004; Berdegué and Schejtman, 2008).

This broadening of goals brings a number of context-specific issues into discussion which might raise fundamental doubts about the suitability of the territorial approach in Latin American countries. In some of these countries, there still persist severe open and conflictive issues that offer a strong legitimacy to revindicative rural-based social movements, in particular around access to land (Caldeira, 2008) or indigenous identity and rights (Yashar, 1998; Hooker, 2005). Severe inequalities and pervasive social conflicts provoke social movements to direct priority attention towards 'negative sum', redistributive questions rather than towards potential 'positive sum' generation of additional growth or new economic opportunities (Bebbington et al., 2008).

Other topics could also hinder the effectiveness of the approach; among others, the actual urban demand for rural commodities and non-commodities, weak state legitimacy – either at national or local level –, the lack of robustness of the institutional architecture or the poor record of the accumulated experience with the 'community development' approach (Ambrosio-Albalá, 2007). Concerning the institutional architecture, in such contexts decentralization should clearly not be seen as a panacea. Risks of local government capture by local interest groups and elites are high (Bardhan and Mookherjee, 2000; Bardhan, 2002), so is the eventuality of failing to identify economies of scale for delivering public services or to deal with regional spill over. Central governments have to play a major role in the design, regulation and coordination of territorial development policies (De Ferranti et al., 2005). In the EU experience, partnerships actually do not emerge from the grassroots as the upper levels of the public administration determine both the fundamental incentives and the working rules (Shortall, 2004).

Besides these cautions, some aspects of the territorial approach for poverty reduction have been tested through 'community-development' interventions. Some assessments criticize the effectiveness of the participatory approach to effectively target the poorest, the lack of clear evidence on the causal link between the interventions' dynamics and the outcomes as well as the strong external influence on such outcomes (Mansuri and Rao, 2004). Other critiques on the influence of elites in collective action and outcomes are not conclusive. On the one hand, some sources draw attention to the heterogeneity of collective interests as well as to the possession of available skills and the access to resources and spaces allowing to take part in decision-making (Bhattacharyya, 2007). Resistance from local elites to political decentralization and even the capture of local social movements can burden such participatory processes (Schönwälder, 1997). On the other hand, in some cases no relationships have been found between community's capacity for collective action, elite control over project decisions and elite capture of project benefits (Dasgupta and Beard, 2007). A distinction between 'benevolent' and 'pernicious' elites is then likely to be important for understanding project dynamics and outcomes (Mansuri and Rao, 2004). Also highlighted is the need for a shared perception of interdependence among those agents involved in order for the collective action to be effective (Beard and Dasgupta, 2006).

In spite of the critiques, the territorial approach seems to be attaining increasing recognition for working in rural areas (Soto Baquero et al., 2007). In a working field that covers such a diversity of topics, its main contribution might be precisely to provide a strategy to help rural change occur. The approach aims at developing local capacities to overcome rural disadvantages, by fostering a broad visualization of rural potentialities that are not restricted to primary activities. It encourages experimentation and innovation in local responses. It also

underlines the importance of how local actors interrelate among themselves and interact with external agents. In its essence, it entails a different perspective on the strategic management of rural territories, by which local actors take a larger responsibility to tackle external changes and a greater control on the development path of their territories. Perhaps this managerial approach is not being fully grasped by the assessment exercises of the interventions. New considerations on the structural and systemic outcomes should be taken into consideration. This is the basic assumption of this paper. The following discussion will explore some pathways where such outcomes could emerge.

Our argument is inspired by two broad theoretical perspectives: complexity thinking and institutionalism. The discussion is organised in four sections. First, we deal with our object of intervention: the rural territory as a 'socio-ecological system' which features complex interactions between human action and natural resources. Second, we introduce the temporal dimension and reflect upon the dynamic nature of the territorial system. While some general evolutionary patterns will be identified, we argue that deterministic approaches are to be avoided. Third, we consider the spatial dimension. Even when rural territories inevitably require some delineation of boundaries in order to operationally function as objects of intervention, they must at the same time be conceptualised as open systems in interaction with broader systems. Indeed, both bottom-up (from the territory towards the outside) and top-down (from the outside into the territory) influences are often critical drivers of change. And fourth, attention is directed towards the local agents, which play a key role as the main drivers of endogenous changes in the territory.

3. Object: the rural territory as a complex system

Rural studies have broadened their focus from merely technical and economic agrarian issues to a wider array of topics, inspired by disciplines such as sociology, politics, anthropology, ecology and history. This shift has brought rural studies closer to a multi-disciplinary approach, attempting to characterize the multiple factors that affect social, institutional and economic dynamics in rural areas as well as their mutual interrelations.

The growing success of such a multi-disciplinary approach reflects an increasingly shared intuition concerning singularities of rural areas that cannot be fully captured by means of mono-disciplinary analysis. Among these singularities, rural areas can be conceived as relatively isolated areas away from more dynamic centres of activity and yet highly sensitive to modernization dynamics from urban areas. These rural areas usually set aside from centres of decision-making, with economic and social structures closely dependent on agrarian activity as well as a social and economic heterogeneity which is not always sufficiently taken into account. Also, some specific rigidities and shortcomings appear to be quite common in such areas, in particular a kind of collective sense of permanent crisis related to decades of macro-economic discrimination and political neglect, often translated in a certain degree of fatalistic determinism in the vision of the future and an affected exaltation of external as compared to endogenous factors of success in development (Woodward, 1996; Cruickshank, 2009).

A traditional, narrow understanding of disciplinary methodological rigour has compelled many scholars to make abstraction of a number of potentially relevant factors and thereby elaborating models of understanding that are only valid under very restricted circumstances. On those occassions where systemic assessments of rural development were attempted (Bontkes, 1993; Vanclay et al., 2003a; Vanclay et al., 2003b; Jamal et al., 2004; Johnson et al., 2008), they have frequently relied on the assumptions of general systems theory and systems dynamics (von Bertalanffy, 1968; Forrester, 1961). These approaches assume that systems are shaped by static entities linked by linear relationships; that these relationships are defined by flows and stocks, emphasizing the quantities of flows; and that systems exist in equilibrium, thus denying the need to examine changing dynamic and non-linear interactions and relationships (Tweeten, 1974; Manson, 2001).

Operationalizing the multi-disciplinary intuition in rural analysis is also handicapped by restricted concepts and tools provided by the separate disciplines. Even though multidisciplinary approaches tend to be very common in dealing with the multidimensional reality, they often just result in a simple addition of mono-disciplinary analysis around such a multifaceted research object. In a similar way, the rural territory and its interacting socio-ecological systems have traditionally been assessed as a mere sum of its constituent parts and subsystems, dealt with in an additive multi- rather than inter-disciplinary manner for lack of analytical categories and conceptual tools to comprehend rural territory from a holistic perspective (Beaulieu, 2005; Krannich, 2008; Wiek and Walter, 2009). A more integrated interdisciplinary analysis is thus required yet without rejecting the contributions of single disciplines (Redman et al., 2004; Jansen, 2009). It is here that the field of complexity sciences provides a promising ontological approach to build a framework of analysis for rural areas.

3.1 Complexity and complex systems

Complexity science studies how the interrelations of parts of a system give rise to the emergent collective behaviour of the system and how the system interacts with its environment (Prigogine, 1987; Kaufman, 1993; Waldrop, 1992; Sardar y Ravetz, 1994; Funtowicz & Ravetz, 1994; Levin, 2005). This new field of science focuses on the complex interactions between parts and wholes, relationships and feedback mechanisms.

In order to deal with complexity, efforts are required to comprehensively and systemically come to grips with reality as an ever-changing whole. In complexity theory, empiricist-positivist rationality and linear thinking, which are common in disciplinary approaches inspired by the exact (agronomic) sciences, economics and even other social sciences, are challenged. Of course, the application of scientific method aims to generate knowledge that relates the real world (natural and social systems) to the world of ideas (representation). Often, scientists try to code the former into formal systems and to improve their reliability by successive modifications. Yet the insights from complexity science indicate that a formal system will never be able to fully capture the real world due to the complex dynamic nature of the real world and its intrinsically unpredictable outcomes (Flood, 1999). Morin (2005) argues that misrepresentations in scientific knowledge are not a matter of erroneous perceptions or shaky logic, but rather follow from the way in which knowledge about reality is typically organised in systems of ideas. Deterministic and linear causality-based models have long prevailed, and continue to dominate, both in natural and social sciences. Positivist and Newtonian paradigms have impelled towards determinism and reductionism, making also believe that simple, foreseeable and linear phenomena prevail in nature and the human world. As a consequence of that, scientific mental models are limited in their capacity to elaborate more appropriate cognitive and theoretical frameworks in order to represent the structure and dynamics of the real world. Given that every experience is informed by theory (Hanson, 1958), a theory based on reductionist knowledge and partial information logically generates incorrect actions (Holling, 1997).

Following complexity theory, path dependency, feedbacks and unpredictability are fundamental features of the real world. These phenomena stem from the nature of interrelations among the parts of a system. Complex systems are shaped by a multiplicity of independent elements interacting with each other in such a way that they bring about collective behaviours that cannot be simply inferred from the individual behaviour of these elements but only through their interrelations (Waldrop, 1992; Bar-Yam, 2003). Consequently, analysis of the behaviour of a complex system should highlight the interrelations of the constituent parts, rather than their individual behaviour. From this perspective, a 'rural area' is not shaped, inter alia, by individuals, farmers, roads, traditions, local governments or forests (as the constituting 'cells' of the rural area), but rather by the continuous interactions among all these elements and other exogenous elements. In the complexity perspective, unlike in the cybernetic paradigm of system dynamics (Forrester, 1961), there are no longer clear-cut and unequivocal mechanical cause-effect relationships between the constituting parts of a system. The complex, non-linear interactions among them determine the nature of the system and its emerging evolutionary outcomes. Thus such interactions, and not only the elements in themselves, have to become the object of study.

According to a complexity approach, the collective behaviour of complex systems should be explained by the nature of these interplays (Prigogine, 1987; Goldstein, 1999). First, elements are mutually interrelated and their functions within the system draw on the interplays with other elements. Interrelations are not only direct and in one single-forward direction. Short-range interplays between two elements affect the rest of the system. Multiple interrelations and back loops may occur. Second, interrelations are non-linear. Back loops may change the behaviour of an element. Given that the feedbacks may be either positive or negative, repeated interplays may bring about different outcomes. More than one path of change can appear (adaptive non-linear influences). Third, the intensity of the changes and their evolution depend on the initial conditions of the system and so do the state of the elements and their current interrelations (hysteresis). As a consequence of this, the behaviour of the system is reliant on the previous interrelations and hence history matters (path dependency). And fourth, it is difficult to define the boundaries of the system (open system, seemingly non-reductionist perspective). Given that interrelations 'within' the system are non-linear and interactions with elements beyond their limits are constant, it is not possible to anticipate their future evolution (nondeterministic).

These features explain two fundamental mechanisms of complex systems: emergence and self-organization. Non-linear interplays generate outputs whose properties have nothing in common with those of their constituting elements taken individually. The appearance of this 'novel output' is known as emergence. This emergence gives rise to structures, patterns which respond to the internal logic of the system (Haan, 2006). These patterns are outcomes of self-organization, the tendency for small effects of bilateral interrelations to become magnified when conditions are right, instead of dying away (Waldrop, 1992). This replication and amplification of the interplays are based on the mechanism of 'positive feedbacks' (Arthur, 1989; 1994). This 'self-reinforcement' brings about some sort of spontaneous order, the 'novel output'. The economy is a self-organizing system; individual decisions of buying and selling organize the market structures in a spontaneous way (Krugman, 1997; Ball, 2005; Martin and Sunley, 2007).

However this 'novel output' is neither stable nor tends to equilibrium. Given that it is an open system, small perturbations received by any element may provoke changes in interplays. Non-linearity and hysteresis make the system self-organize in a different way and produce new emergent states. Thus variety and novelty in a system's behaviour is unpredictable (Flood, 1999) and seemingly chaotic. In effect, this dynamic behaviour traces a continuum of states of stability (attractors), a pathway of emergent outputs that result from different configurations of the system (processes of self-organization). That continuum sets aside the idea of a long-enduring and single equilibrium towards which the system tends to move, while it reinforces change and adaptation as the fundamental features of complex systems.

These concepts of emergence, self-organization and attractors point out that systems are permanently affected by perturbations. These impact on the elements, modify their interactions and make the system evolve across states of stability. This transition is far from being an abnormality. While permanently receiving impacts, this transition represents the natural evolution of every system in order to endure. In accordance with the existing conditions of the system and/or the intensity of the shocks/crises, the system can either move towards new states or get trapped in a certain state. To explain such situations, the metaphor of the landscapes of stability is used.

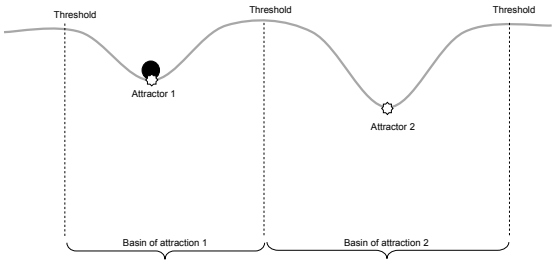
3.2 Perturbations and 'states of stability'

Assuming that a system can be represented by a set of variables, we can define the following (Walker et al., 2002; 2004):

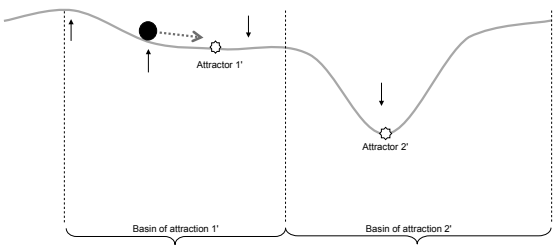
- a state of the system as one possible combination of all different values of the variables that constitute the system;
- the state spaces or 'configuration' as the whole set of feasible combinations of states;
- an attractor or regime as one state of stability towards which the system tends to move;
- a basin of attraction or 'stability domain' as the region of state spaces where the system tends to remain. A basin of attraction represents all possible configurations of variables around an attractor. In the real world, systems are continuously buffeted by shocks, disturbances and the decisions made by the individuals. Those factors can induce a system to move away from a given attractor towards a new one, changing towards a new basin of attraction.
- For any given system, there may be more than one basin of attraction. The limit between two basins of attraction will be termed a threshold.
- The set of basins of attraction that a system may occupy as well as the thresholds that constitute the boundaries between basins are called the stability landscape.

Figure 1: Perturbations, states of stability and basins of attraction

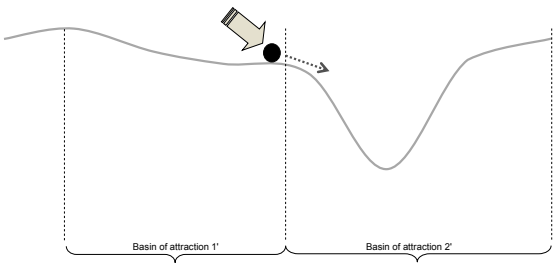
(a) Stability landscape and basin of attractions



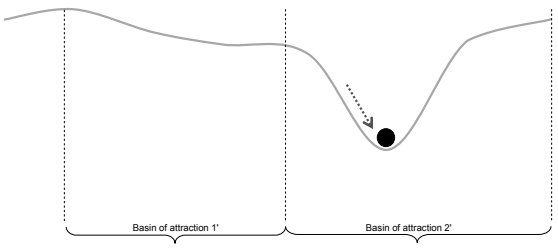
(b) Changes in the basins of attraction



(c) Effect of perturbations over the system and basins changes (i)



(d) Effect of perturbations over the system and basins changes (ii)



SOURCE: own elaboration, based on Walker et al. (2004).

The mechanism of change of a system can be explained in terms of transition along 'basins of attraction'. In terms of ideal-types, it may be graphically represented by means of two-dimensional stability landscapes (Figure 1(a)). The valleys represent basins of attractions and the discontinuous lines are the thresholds. A basin of attraction contains the set of states that

serve as "initial conditions that will tend toward an 'equilibrium' state" (Walker et al., 2004). Such state is located at the bottom of the valley, as a stability state for the system. Every basin is delimited by thresholds values. Endogenous changes in the system and the influence of external factors shape the scenario of valleys within which the system moves. A change in the conditions may entail certain shifts in the system, but cause no immediate effect in the prevailing state of stability (Figure 1(b)). However, the accumulation of many tiny impacts may provoke changes in the landscape that at one point can generate a fundamental alteration of the state of stability towards which the system moves (e.g. from attractor 1' to attractor 2'). These changes can then make the system to move beyond a threshold and gravitate towards a new basin of attraction (Figure 1(c)). In this situation, the system becomes highly vulnerable to any perturbation. Once it occurs, the system exceeds the threshold and goes into a new basin of attraction (Figure 1(d)). As is graphically shown, the depth of the basin is a proxy of the efforts needed to move the system from one to another state. The deeper the basin, the larger the efforts required.

Given that changes and perturbations continuously affect a system, the main implication is that a system does not move towards a single and stable 'equilibrium' but transits across many stability states. The ability of the system to undertake this transition leads the key idea of resilience and the ability of a complex system to recover from random perturbations and shocks.

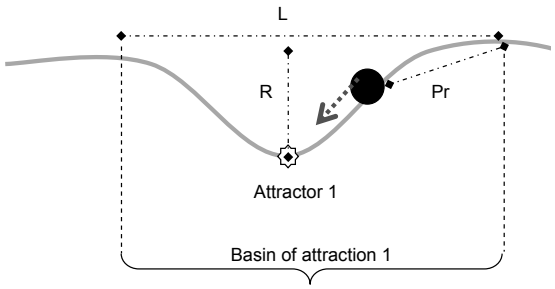
3.3 Moving towards new stability states and enduring: resilience and adaptation

In ecology studies, the term 'resilience' was coined by C.S. Holling as "a measure of the ability of [an ecological system] to absorb changes of state variables and parameters, and still persist" (Holling, 1973). Since this seminal contribution, resilience has been indistinctly used to term the amount of perturbation that the ecosystem can bear without distorting its functions and structures, the degree to which one system is able to self-organize as well as the ability of the system to learn and adapt (Walker et al., 2002). Other definitions refer to the speed of recovery of the system once the perturbation ceases and the exogenous ability to help recovering the system (Anderies et al., 2004). Two fundamental issues related to resilience are the self-organization ability of the system (Abel et al., 2006) and the critical role of agents and organizations for the governance of the system (Olsson et al., 2006). In social systems, the term can also be used for the ability of the agents to cope and recover from perturbations resulting from social and political changes and crisis (Adger, 2000). This is not necessarily positive since a dictatorship or a highly unequal stratified social system (e.g. the Indian caste system) can also develop the mechanisms needed to be resilient (Mubarak, 1997). So that the management of the resilience entails ability in the agents either to make the system remain in a given basin of attraction or to move it into another more desirable basin[1]. For the purpose of this paper, the term 'resilience' will be referred to as the system's ability to absorb perturbations and to self-organize to endure[2].

[1] In the latter case, adaptation can be carried out in two ways: (i) making the system cross the threshold (move into another basin, go far from an undesired attractor); (ii) making a threshold cross the system – changing the basin, by influencing the (external) conditions that define the scenario where the system operates. Moving across other panarchy's scales and levels above and below is critical for that.

[2] For a further discussion on the resilience concept applied to regional economics, see Chistopherson et al. (2010).

Figure 2: Resilience dimensions in a bi-dimensional basin of attraction



SOURCE: own elaboration, based on Walker et al. (2004).

Resilience can be broken up into four critical dimensions (Figure 2). The first one is the largest amount of perturbations that a system can bear before completely losing its ability to recover (latitude). The loss of this ability is linked to the moment in which the system steps over a threshold, complicating and even hindering the recovery of the system, that is, its transition to a different state of stability. The larger the breadth of the basin of attraction (L), the larger the set of stability states a system can experiment without stepping over the thresholds. Second is the ease or difficulty to change the state of the system (resistance). It is represented by the depth of the basin of attraction (R) or, more precisely, by the ratio R/L. The deeper the basin, the more efforts or changes will be needed to move the system away from the attractor. Third is the proximity of the system to a limit or a threshold (precariousness). The larger the precariousness (1/Pr, for Pr closer to the threshold), the larger the emergency is to introduce changes in the system, assuming that changes in the basin of attraction are not desirable. And fourth, the influence exerted by another system (either located outside within a higher scale, or inside of the system). This issue will arise again once the idea of panarchy is presented.

3.4 Implications for rural territories

3.4.1 Rural territory as a complex social-ecological system

We have conceived rural areas as relatively isolated areas, set aside from the centres of decision-making, economically and socially heterogeneous, largely dependent on natural resources (mainly through agrarian activity), highly sensitive to exogenous modernization dynamics through linkages with urban areas, often with a kind of collective sense of lasting crisis and a deterministic and fatalistic vision of the future.

Theoretically, rural territories can be conceived as complex systems, and as such as open social systems that exchange resources and information with each other and their environment, and that continually create new structures and order (Ramalingam et al., 2008). The intensity of these exchanges challenges the artificial 'division' between rural and urban areas, making the idea of a rural-urban continuum more appealing (Tacoli, 1998; 2003). Commercial linkages, migration and remittances, second residence and leisure activities are among the flows that form the 'rural-urban linkages' (Bendavid-Val, 1989; Douglass, 1998; Bah et al., 2003). 'Intermediate cities' (Trager, 1988; Bolay and Rabinovich, 2004; Satterthwaite and Taccoli, 2003; Caravaca et al., 2007) play a critical role in the emergence and facilitation of these flows.

Rural areas are a specific type of complex system: a social-ecological system (SES) shaped by the relationships between ecological and human subsystems. Anderies et al. (2004) define a SES as a "subset of social systems in which some of the interdependent relationships among humans are mediated through interactions with biophysical and non-human biological units". In a wider sense, a rural territory can be conceived as a SES shaped by both social and ecological subsystems in interaction. The survival of the former heavily depends on its interrelations with the later; patterns of settlement and exploitation reflect the human action exerted over the environment and natural resources, just like water stocks, mining resources or biodiversity, among multiple circumstances, condition the living and productive strategies of the population.

3.4.2 Perturbations and states of stability in rural areas

Far from being a static reality, however, rural areas are permanently affected by perturbations and shocks of various types.

In the case of the ecological subsystem, these are mostly related to natural events (floods, droughts, earthquakes, climate change) and other underlying processes that take longer to make themselves felt (loss of biodiversity, depletion of water resources, species extinction or natural soil improvements/degradation). In spite of the close relationship between the human and ecological subsystems of a SES, an eventual collapse of the ecological subset does not automatically involve the loss of resilience within the system as a whole or within the human subset (Anderies et al., 2004). Of course, certain human subsets may be more sensitive to ecological shocks, in particular those who are dependent on one particular resource or ecosystem (Adger, 2000).

Perturbations also relate to the social subsystem. Some of them are unexpected and abrupt (epidemic outbreaks, violent demonstrations, civil conflicts), affect basic needs (food crises, illiteracy), change the livelihood strategies of the population (migration, unemployment), shape economic activity (hyperinflation, changes in prices of commodities, taxation, trade barriers) or find their origin in socio-political issues (shifts in political regimes, corruption). Alterations do not only involve negative effects. Communication and transport networks, agrarian subsidies, trade barriers, incentives for economic diversification or biodiversity conservation, relations between government agencies and local associations, may all affect the opportunities and constraints for the rural population.

These can be related to the livelihood conditions of the population; to the ability of the local entrepreneurs to launch and develop their businesses, to access new markets or to upgrade their farms; or to the capacity of local authorities for designing their own formal institutional frameworks, to tax incomes or to regulate activities, land use and the exploitation of other natural resources. The amount of stability states will decrease when any of these changes eventually reduce the amount of possible values for the variables of the system (increasing the constraints or reducing the opportunities for change). This then makes the basin of attraction deeper, thereby leading to the collapse of the system under its current configuration; that is, considering the variables that at this time shape the system.

3.4.3 Coping with perturbations in rural areas

The human subset plays a critical role within a SES. Unlike the constituents of the ecological subsystems, humans are 'interpretive beings' who can confront the rules and laws that affect their behaviour, and who may wish to change them (Stacey, 1996; quoted by Flood, 1999). Wherever a human subset is present, perturbations or shocks may therefore be countervailed by means of deliberate action.

In a SES, resilience cannot be detached from the lived realities of the people. These realities define the set of livelihoods affected by the crisis and perturbations, which at an aggregate level impact on the rural area. Different realities bring about different perceptions of the relevant variables and thresholds in the system as well as different perceptions of the desired states of stability (Osbahr and Boyd, 2007). Thus resilience is a subjective concept. Four dimensions are proposed to help operationalize it. Managing resilience entails acting upon any of these dimensions (Folke et al., 2004; Walker, 2005).

Firstly, the capacity to increase (reduce) the range of values for the variables of the system, i.e. to alter the number of stability states (latitude). One of the main concerns in rural areas relates to the extent to which the productive strategies of the producers fit into sustainable patterns; that is, accommodate to the range of stability states provided by the capacity burden of the ecological subsystem (Bradley and Grainger, 2004). From the perspective of mono-activity or economic depressed areas, seizing idle endogenous resources may require the generation of knowledge about income alternatives based on those assets and the diversification of territorial economy (Simmie and Martin, 2010).

Secondly, the capacity to modify the difficulty (ease) of changing the system (resistance), i.e. to change the values of the variables of the system. Since we are dealing with human actors as interpretative beings, 'slow-changing variables' such as identity, mental models and prejudices play a key role in the resistance to or the support for certain pathways of change. People may have diverging opinions on the most appropriate regime to cope with the resilience of the system. Differences in power and resources condition their 'voice', i.e. their ability to make their views prevail (Redman et al., 2004). The resistance dimension can be improved by guaranteeing a more equitable distribution of gains and costs among groups, prompting social attitudes favourable towards novelty or encouraging mobility. The migrants may indeed work as channels of innovation for their communities, though they have been considered as a loss of potentiality for rural areas (Bjarnason and Thorlindsson, 2006; Stockdale, 2006).

Thirdly, the capacity to drive the pathway of the system by moving it far from (closer to) thresholds (precariousness). The precariousness dimension gives a sense of promptness to undertake changes and can be tackled through changes in consumption and productive patterns, social conflict resolution or by modifications in the regulatory framework. Because of intense rural-urban migration, depopulation threatens the potentiality of rural human capital, in particular when most of the emigrants are young and skilled. Fostering competitive advantages should not lead a rural territory to privilege mono-activity (similar to those areas dependent on large industrial factories: mining, energetic resources, naval industries). Just as in the case of mono-crop farming in the face of falling prices, such territorial rigidities make adjustments, when needed, more costly. Regarding the ecological subsystem, technological innovations and

more sustainable patterns of production, consumption and settlement may reduce the pressure exerted by human agents.

Finally, the capacity to be present at other levels and scales to make changes happen (not happen) in the system (panarchy). This panarchy dimension is closely related to the creation of new scales, levels and interplays. Appropriate actions to this end are political decentralization, multi-level approaches for policy-making, enhanced access of local agents to decision-making processes in upper levels or a greater sensitivity to innovation efforts in lower levels of the panarchy. This dimension will be further developed in the following sections.

4. Time: evolutive patterns in social-ecological systems

The second key element of the proposal is related to the dynamic nature of the territorial processes. In spite of the apparently chaotic transition across states of stability suggested by the previous argumentation, if a larger temporal scale for this transition is taken into account, a SES may show recurrent patterns of evolution. Contributions made by D.C. North and C.S. Holling will be considered to help represent these patterns. The former explains economic development in social systems (generation of potentiality) as the outcome of institutional change. The latter devises the metaphor of 'adaptive cycles' to propose an ideal-type evolution of a complex system.

4.1 Evolution as a result of changing institutions

North (1990) explains economic development in societies as an outcome of institutional change resulting from competing institutions. As exchanges among individuals progressively shift from personal to enforced impersonal exchanges, the governing rules have to evolve. Steady increases in productivity are acquired by a progressive reduction of transformational costs followed by diminishing transaction costs involved in exchange (Bastiaensen et al., 2002).

The process of wealth creation entails an increasing number and complexity of exchanges and social interactions among the agents of a social system. This requires a concomitant evolution of institutions, i.e. the norms that govern exchanges and relations of any kind among individuals within a society. They limit contingencies and induce certain patterns of behaviour, becoming sources of stability for individuals, especially when they face increasingly complex exchanges.

The slow process of institutionalization of norms and rules in a society guarantees security and certainty for those exchanges. External sources can play a catalytic role in institutional change: foreign investments can broaden the employment options; aid organizations can provide incentives to develop collective action for productive or policy purposes; local governments may be forced to improve management and increase local taxes when central transfers are reduced and more responsibilities denied by the central administration; returned emigrants may wish to set up businesses or introduce new technologies inspired by their experiences abroad. Existing institutions can gradually become obsolete, as they provoke changes in the structure of incentives and preferences of the agents: due to expanding employment opportunities, traditional occupations may suddenly lack the necessary labour force and be obliged to offer higher salaries or better hiring conditions; empowered collectivities may demand new rights and more 'voice' in political processes; organized producers can better negotiate the input prices from providers or undertake larger investments; greater responsibility over their finances may impose upon the municipalities new constraints on the local expenditures and demand more accountability on taxing decisions. In an open social system, changes in these structures constantly occur.

Theoretically, old institutions will be replaced by others that further reduce uncertainty, provide more gains and reduce losses. From this perspective, the most efficient framework would seem to prevail. However, the process also establishes a seed for social rigidities.

In many societies the institutional framework might hinder change. This can be due to the increasing return to existing norms and the need for their progressive institutionalization (Arthur, 1989); the prevalence of relative gains and losses among different groups of individuals (Bardhan, 2001); the persistence of status quo due to the power of vested interests (Bardhan, 2001); or the weight of inherited perceptions (Bastiaensen et al., 2002) and cognitive limitations to conceive alternatives to current institutional framework (Dimaggio and Powell, 1991), as well as the 'public good' character of the process of institutional change in itself.

4.2 Evolution as recursive pattern

Studies of dynamics in complex systems show some regular patterns in their evolution (Holling, 2001; Beisner et al., 2003). These regular or recurrent patterns suggest that a complex system needs change and evolution to endure.

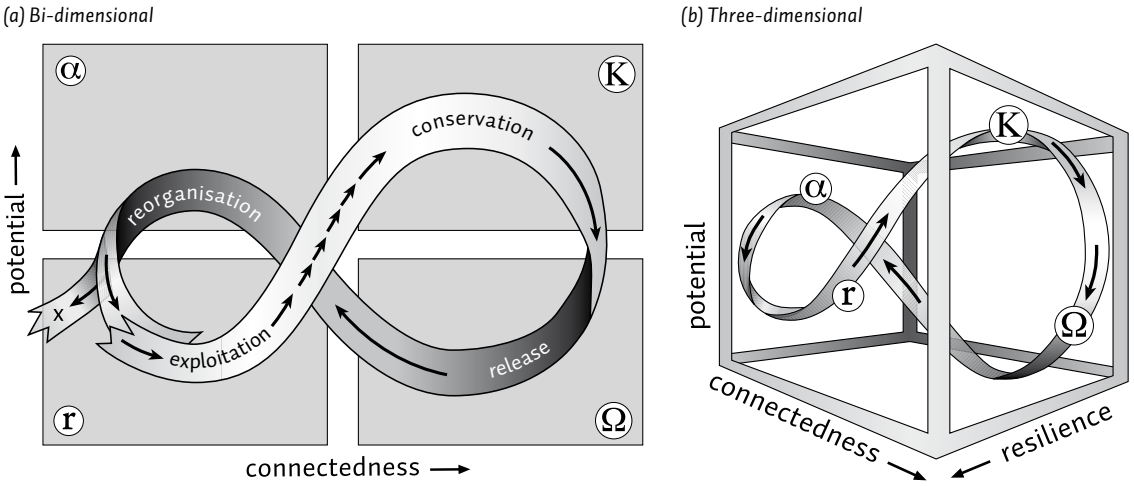
In order to make these dynamics of a complex system intelligible, one needs appropriate units of analysis. First, a complex system is a 'static' concept. Thus to consider this evolutionary and dynamic character within it, the idea of 'adaptive cycle' (Holling, 2001) will be assumed. Both 'complex system' and 'adaptive cycle' refer to the same reality but, respectively, from static and dynamic perspectives. An adaptive cycle is formed by stages. Every one of these stages is associated to different states in a complex system, considering a state as a combination of their defining variables and different degrees of potentiality, internal controllability and resilience. These three emergent features shape future and feasible states of a SES. Potentiality is the wealth of the system, the potential array of assets that is "available for change as they determine the range of future options possible". Internal controllability refers to the "degree of connectedness between internal controlling variables and processes". Resilience is "a measure of its vulnerability to unexpected or unpredictable shocks (…) can be thought of as the opposite of the vulnerability of the system" (Holling, 2001).

4.2.1 Stages in the adaptive cycle

Within an adaptive cycle, four fundamental stages can be defined (Holling, 2001; Walker et al., 2002). A first stage of rapid growth and exploitation of the system's potentiality appears (stage r), followed by a lengthy phase of accumulation of resources and potentiality, monopolization and conservation of the system's structure (stage K)[1]. In both stages, a tendency to maintain this structure can be observed, hence allowing this phase of accumulation. This conservative tendency also stimulates the accumulation of rigidities in the system, which becomes more vulnerable to any change or alteration. The following phase (stage OMEGA) represents a sudden break in the growth stage, releasing the accumulated potential during a situation of 'creative destruction'. The cycle concludes with a relatively short phase of renovation and reorganization of the system's structure (stage ALPHA), giving rise to a new phase of accumulation (r') and a new cycle. Figure 3(a) and 3(b) shows the usual way of representing these four stages in the adaptive cycle

[1] The name of these stages stems from ecology studies: r from the rate of growth of a population, and K from the carrying capacity of a population.

Figure 3: Ideal representation of an adaptive cycle



SOURCE: Holling (2001). Arrows show the speed of changes: discontinuous arrows indicate fast change; continuous arrows indicate slow change.

On a bi-dimensional basis, the four basic stages are shown as a continuum of states, combining different values of internal controllability (or connectedness) and potential. The different lengths of every stage are represented according to the arrow type: faster stages (shorter time) by continuous arrow, slower stages (longer time) by discontinuous arrow. The inclusion of the third feature (resilience) needs a three-dimensional representation, as shown in Figure 3(b).

As shown in figure 3.b. (bottom-right), the resilience of a system is a changing feature. It expands and shrinks across the different stages of the adaptive cycle. For a better visualization, this ideal three-dimensional representation of the cycle can be split up further into three free-hand drawn graphs: internal controllability (Figure 4), potentiality (Figure 5) and resilience (Figure 6).

Figure 4: Ideal evolution of 'internal controllability' within an adaptive cycle

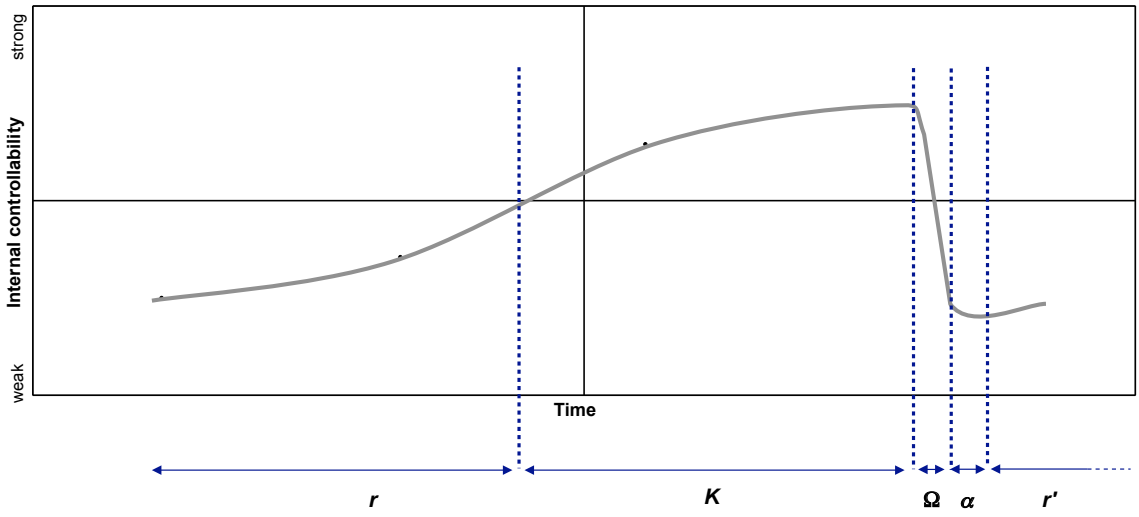


Figure 5: Ideal evolution of 'potentiality' within an adaptive cycle

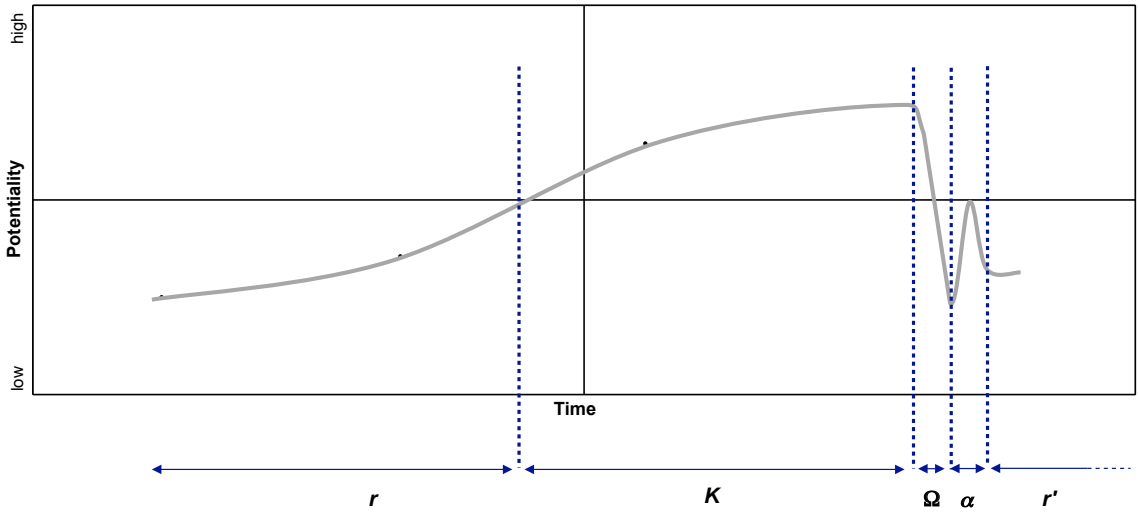
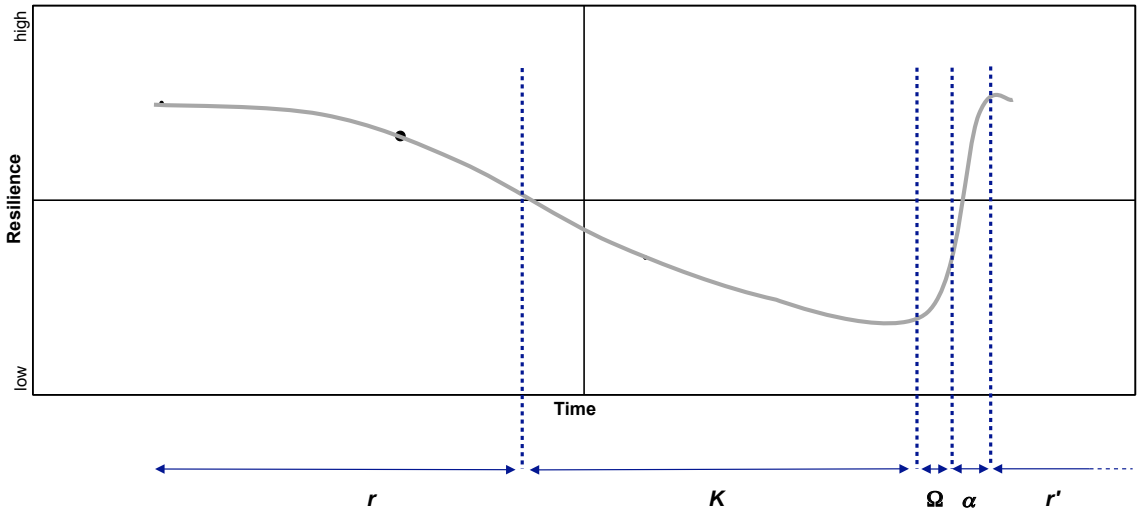


Figure 6: Ideal evolution of 'resilience' within an adaptive cycle



Dividing lines between stages are merely indicative. The four stages may be associated to two basic dynamics of the system: a forward, expansive and proactive dynamic (stage r to stage K) and a 'back loop', recessive and retroactive dynamic (stage OMEGA to stage ALPHA).

The 'forward dynamic' begins with a steady accumulation and transformation of the assets of the system (r-stage). As these assets transform, potentiality and efficiency accumulate. The connections between key variables and endogenous processes (internal controllability) increase, and hence the governance of the system is reinforced as it becomes more productive. This increasing connectedness involves a greater stability within the system, which becomes more predictable. However, a higher connectedness also reflects an increasing monopolization of critical assets in just a few expropriators or 'key controllers', even when a wide variety of competitors may exist. In other words, the production of assets increases the potentiality of the system, at the expense of increasing internal controllability, stability and monopolization.

The maintenance of a specific structure (governance), by which the system grows so rapidly, produces at the same time the emergence of rigidities. Therefore, the accumulation of these rigidities steadily diminishes the resilience of the system and hints at a crisis. The adaptive cycle is in the maturing phase of stage K, with minimum levels of resilience and high sensitiveness and vulnerability to small changes. The system becomes "an accident waiting to happen" (Holling, 2001).

The transition from stage K to stage OMEGA implies a sudden break in the forward dynamic and the start of a 'recessive dynamic', a short period of time that provides an opportunity for innovation. During this stage, internal controllability and potentiality are at their lower levels, and the systems' evolution becomes highly unforeseeable. This phase offers an appropriate environment for re-configuring key variables and processes of the system, experiencing and undergoing transformations, as well as re-validating foreign or own configurations that were previously rejected.

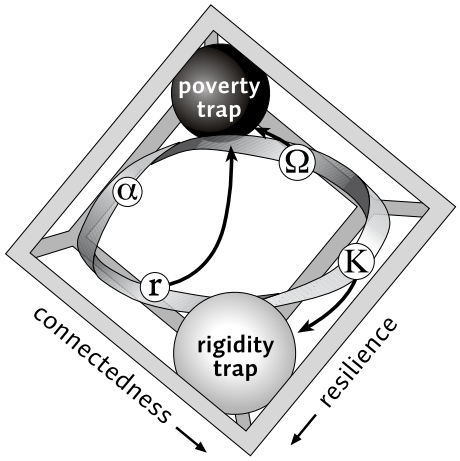
The ensuing transition to stage ALPHA implies: (i) weak connectedness between key elements of the system and weak internal controllability over critical processes, as they are being re-configured; (ii) broad margin to re-define a new 'state of stability' for the system and, according to this, a new potential to use; and (iii) a re-generation of the resilience, as the new configuration of key variables and processes crystallizes and reinforces itself.

Re-configuration of the system will greatly depend on the suitability and appropriateness of the elements and processes that constituted the system. Those who are considered to remain valid after the crisis will be maintained in the new set-up. But logically the weakness of the system during crisis also makes it vulnerable and open to exogenous innovations. As a result, new exogenous elements are often incorporated in the renewed system in order to maintain or to improve the resilience of the system. These 'recessive dynamics' generate recurring periods of crises, each of them constituting opportunities to re-organize system structures and processes.

4.2.2 Trap states within an adaptive cycle

This alternation between 'forward' and 'recessive' dynamics in an adaptive cycle not always goes smoothly. Just as some social systems may be unable to undergo institutional changes and get trapped into a specific institutional framework, so a system may also become locked in 'trap states', as some features do not develop as expected. Holling (2001) identifies two trap situations: a 'poverty trap' and a 'rigidity trap' (Figure 7).

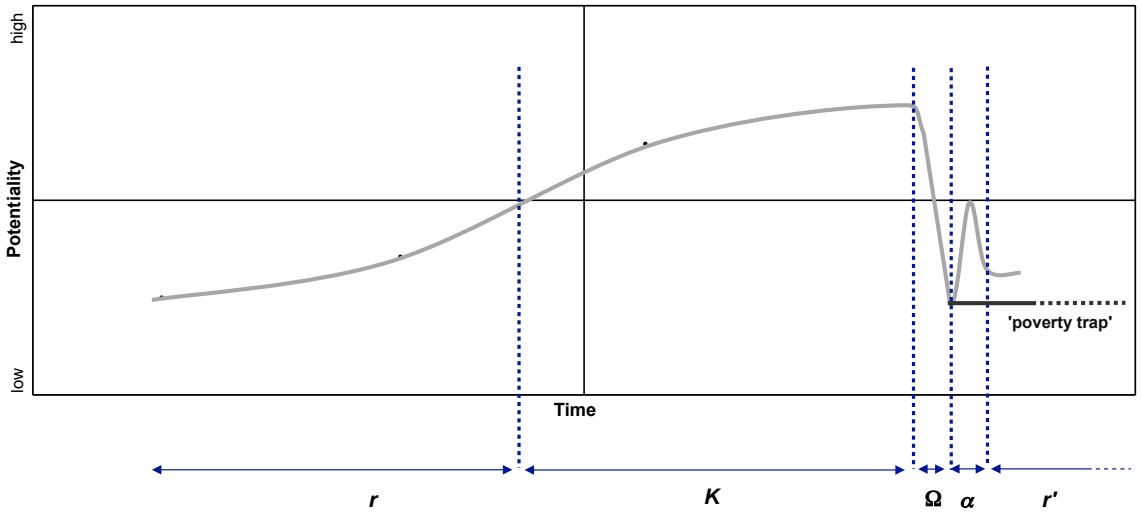
Figure 7: Trap situations within an adaptive cycle: poverty and rigidity



SOURCE: Holling (2001).

The 'poverty trap' entails the collapse of the system when facing a loss of potential or diversity due to the misuse of the available wealth and/or to traumatic events that make the potential disappear. Such an 'impoverishment situation' in the system is characterized by a low internal controllability, a low resilience and, more specifically, by a reduced potential that cannot be re-generated (Figure 8).

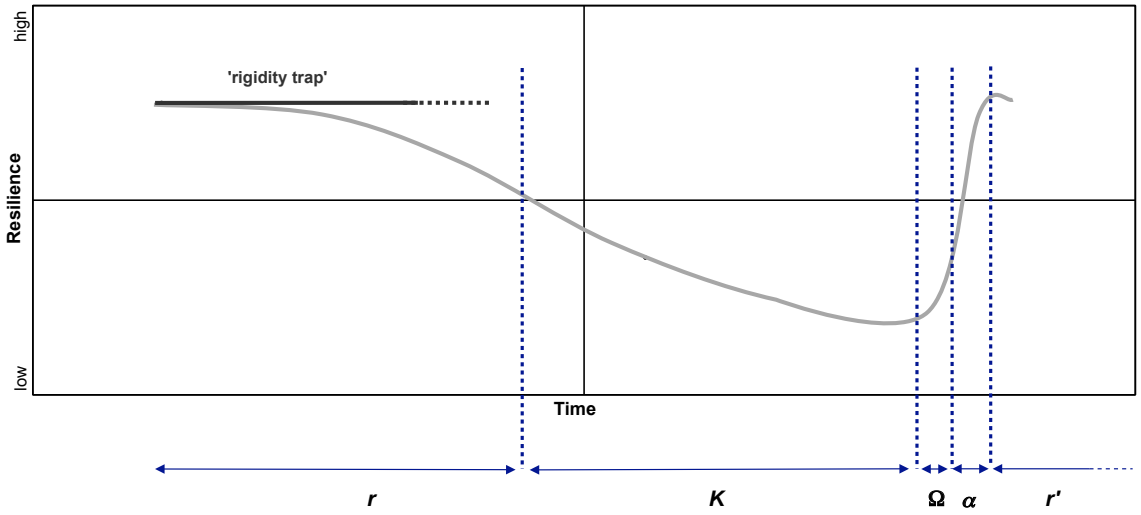
Figure 8: 'Poverty trap' within an adaptive cycle



Once this 'impoverishment trap' appears, Holling (2001) suggests that *"when recovery is possible it would be useful to know what critical attributes need to be reinvented and re-established from the residual memory stored in slowly fading traditions and myths to recreate a new, sustainable panarchy"*.

The 'rigidity trap' directly affects the resilience of the system. In the ideal representation of an adaptive cycle, the start of productive and accumulative stages brings about an increase of internal controllability and potentiality, as the resilience steadily decreases. The 'rigidity trap' emerges when a system becomes highly resistant to innovations or the effect of perturbations (endogenous or exogenous) (Figure 9).

Figure 9: 'Rigidity trap' within an adaptive cycle



Far from being a positive feature, this persistence limits the introduction of innovations (be it as result of creation or adaptation) and generates 'maladaptive systems'. In such cases, high levels of internal controllability may reflect efficient methods of control and repression, which reject any symptom of innovation.

Additional exceptions to the ideal representation of an adaptive cycle are (Walker et al., 2006):

- A re-configuration of the system without releasing or losing a system's wealth (e.g. democratic elections – 'planned rupture' of internal controllability - produce a re-organization of political power without losing potentiality);
- Long term persistence of the system between stages r and K, as the agents continue to invest resources within the existing potentiality), thereby renewing the potentiality and adapting it such as to postpone situations of crisis.

4.3 Implications for rural territories

4.3.1 Features of complex systems

The three emergent features of a social-ecological system can be clearly identified in the rural territories. Potentiality can be associated to assets that are tangible (natural resources, transport infrastructure, buildings, factories) or intangible (knowledge, abilities, social networks, trust in legal and financial systems). Potentiality can also be related to a larger diversity of individuals, broadening the potential array of innovation sources (Page, 2007), even when excessive heterogeneity can also increase difficulties to achieve beneficial collective action (Olson, 1962). Theoretical contributions in this regard may also be associated to 'commodities and capabilities' (Sen, 1985), 'sustainable livelihoods' (Bebbington, 1999; Ellis, 2000), 'territorial assets' (Boisier, 2003) and 'community capitals' (Emery and Flora, 2006).

The idea of internal controllability is closely related to the concepts of embeddedness (Granovetter, 1985) and integration (Woolcock, 1998), which suggest the necessity of cohesion within a group to achieve its collective goals. The emergence of 'new forms of govern-

ance' (Stoker, 1998) points out the benefits of including new actors – besides the government – to drive and control change processes of the system. On the side of the ecological subsystem, this control may be attached to the rights (property, exploitation, use) that are defined over the natural resources of the system and how they are managed by the local agents (Ostrom, 1990; Ostrom et al., 1994).

Finally, regarding resilience, in social systems it is more frequent to deal with vulnerability, the exposure of individuals and collectivities to crisis or perturbations and their inability to prevent, cope with and recover from its effects or impacts (e.g. monocrop farming systems show intense dependency of a single resource, making this SES highly vulnerable to price fluctuations) (Guimarães, 2007). By contrast, resilience reflects the ability of a SES to prevent threats, react and adapt to perturbations. Nevertheless some progress has been made in developing the concept of 'social resilience' applied to rural communities (Adger, 2000; Bradley and Grainger, 2004; Maguire and Hagan, 2007) and of 'economic resilience' from the perspective of regional studies (Christopherson et al., 2010; Simmie and Martin, 2010).

4.3.2 Logic of change in social systems

In ontological terms, both the vision of institutional change and the metaphor of adaptive cycle share a common understanding of evolution and change in social systems. The main coincidences refer to the following arguments (Table 1):

- a greater complexity in exchanges among agents and in their interactions with resources as a sign of progress and wealth generation;
- the need for mechanisms providing stability and reducing uncertainty in those exchanges as they become more complex;
- the emergence of rigidities, which are intrinsic to such stability, and the appearance of vulnerabilities, as these rigidities consolidate;
- the activation of such vulnerabilities, which behave as triggers of change processes, due to the influence of disturbing forces coming from out- or inside the system;
- the undertaking of adaptation processes to overcome endogenous crisis and / or exogenous shocks.

Table 1: Logic of change in social systems

	Complex systems and adaptive cycles (Holling, 2001)	Institutions and institutional change (North, 1990)
Complexity of interactions	Increasing the potentiality of a system demands more complex interrelations and mechanisms that provide stability.	Progress achieved by a society entails an increase in the number and complexity of exchanges and social interrelations. Economic growth relies on increasingly complex exchanges.
Mechanisms of stability	Re-enforcing the internal controlability over key variables and processes of the system attains such stability. These stability mechanisms increase the predictability of the performance of the system.	Institutions, as norms and rules that govern the exchanges and interrelations within a society, are sources of stability needed to provide security to ever more complex exchanges.
Emergence of vulnerabilities	A greater internal controlability also generates ridigities in the system that increases its vulnerability to unexpected shocks and brings about a decrease in the resilience of the system.	Slow consolidation of the institutions within a society (institutionalization) guarantees the security and certainty of the exchanges, while at the same time establishes a 'seed of rigidity' for the social system (lock-in and path dependency).
Sources of change	Shocks and perturbations come from exogenous influence (occasionally can emerge from an imbalanced internal controllability in the system).	Changes in the incentives structure and the preferences of the agents, as sources of change, demand competing institutional frameworks. Exogenous sources may be decisive for change.
Processes of change	Diminished resilience brings about the system to become "an accident waiting to happen". Occurrence of the crises provokes the system to move from an 'expansive dynamic' (growth) to a 'recessive dynamic' (re-organization).	As the institutions become obsolete, processes of institutional change are undertaken. Changes can occasionally emerge in a sudden way, provoking traumatic institutional changes.

SOURCE: own elaboration, based on Holling (2001) and North (1990).

According to the theory of adaptive cycles, an ideal-type representation of evolution in social systems (as complex systems) shows the following phases. It starts with an increasing complexity in interactions between agents and resources, as evidence of the wealth and progress achieved by the system. Simultaneously, mechanisms that provide stability are adopted in order to ensure a greater control of local agents over these interactions and to increase the predictability of the system. At the same time, progressive rigidities emerge as an outcome of these mechanisms. Therefore the system becomes more vulnerable to any eventual shock or crisis (that is, resilience of the system decreases). According to North's contributions on institutional change, those phases can be associated with: (1) the transition from 'personal exchanges' to 'impersonal exchanges with third-party enforcement'; (2) institutions and rules as source of stability and predictability; (3) the hysteretic or 'path dependent' nature of social-institutional processes. When people establish and develop linkages and networks beyond their closest relatives, neighbours or workmates, their range of sources for change broaden. These sources may eventually activate the vulnerabilities of the social system and accelerate the crisis situations that reduce its potentiality and internal controllability (or predictability). Higher levels of both features demand adaptation and structural change processes, resulting in a new cycle. In similar terms, from institutionalism, alternative institutional frameworks are to be considered critical sources of change in social systems.

4.3.3 Some implications for policy making

The discussion about traps, rigidities and change raises relevant questions for rural policy regarding the sources and processes of rural change. Why do some rural territories seem to be locked in pathways of economic stagnation and social conflict? What makes rural areas get out of these systemic "poverty traps"? What makes the change happen? Regarding the process of rural change: does it only occur slowly and gradually, in the long term? Does some kind of driver exist that is capable to generate a faster progress? What role can innovation play? Regarding the institutional mechanisms that condition the uptake of innovations: what role does social inequality play? Can any institutional mechanism be identified that generates inclusive processes of innovation? What sort of social agents become drivers of technological innovation? (RIMISP, 2007).

Poverty can be considered as a systemic trap in many rural areas. There are factors on a larger scale that influence this trap. Conflicts or recent civil wars condition the stability of governments in post-conflict societies. The abundance of natural resources (or 'Dutch-disease') reduces the opportunities for diversification in economic activities, generates rents that induce autocracy and diminishes the incentives for the political groups to self-restraint. In land-locked countries with scarce natural resources, moving away from the poverty trap largely depends on the policies of the neighbour countries (Collier, 2007).

On the local scale, low productivity of rural livelihoods is an indicator of this poverty trap. Risk avoidance behavior, credit market imperfections and increasing returns to the choice of local technologies and occupations are mechanisms behind this low productivity (Barrett, 2003). The increase of productivity demands innovation and access to new technologies. Institutional factors have a well-known effect on the improvement of access and uptake of new technologies (Doeringer and Streeten, 1990; Doeringer and Terkla, 1990). Both innovation systems and governance are key factors for a rural territory to succeed in catching-up (Fagerberg and Srholec, 2008).

Even when markets are efficient at encouraging innovation, market failures usually hinder the access of rural poor to such innovations. Some effective strategies to make the markets more inclusive have already been identified; among others, deskilling in the supply of goods and services, leveraging ICT networks to reduce costs, schemes of flexible payment for buying goods and services with large up-front costs (building material, farm machinery) or contracting innovations (e.g., microfinance schemes of joint-responsibility among borrowers) (Mendoza and Thelen, 2008).

From the territorial perspective, the drivers of any endogenous response are of special interest. At the local level, history needs to be taken into account. The type of interplays among economic agents, the modes of governance between national and territorial administrative structures or the idiosyncratic factors (Iammarino, 2005) are all path dependent. One additional difficulty related to the local autonomous response is found in some identity issues (gender, ethnicity, age, density of social solidarity groups), which hinder even more the presence of incentives for change (Barrett, 2003; Duncan and Christopher, 2007). However, some social systems show ability to change their internal structures while maintaining their perceived identity, as it happens in some community-based organizations that manage natural resources (Warner, 2001).

5. Space: multiplicity of levels and scales in social-ecological systems

From a systemic approach, a rural territory needs to be considered as an 'open system'. In epistemological terms, it is assumed that a system "doesn't exist, but can be defined" (Churchman, 1979; quoted by Flood, 1999: 254-255). Boundaries are to be considered mental constructs. Given that a system is defined as a construct from inter-disciplinary approaches, the boundaries of a system are outcomes of deliberation, a result of choices which are partial and always subject to improvements.

Yet there is a more practical consideration to claim for a stable definition of these boundaries. They are needed to delimit the object of intervention. When studying social and ecological systems, that delimitation has relevant implications in terms of knowledge and action. These boundaries are necessary to identify what the constituent elements of the system are and which ones are to be treated as exogenous. Just as not every factor that influences a SES lies within its boundaries, so the effects of the territorial dynamics (externalities) may move beyond such boundaries. To make such boundaries intelligible and to rationally sort out the outreach of incoming influences and outgoing externalities, a sense of scale is needed.

According to the presence of the human subset in an SES, two basic dimensions of the scales are considered: the mental representation and the organization of the social system. The former affects the relative position that individuals and collectivities have in relation to their surroundings. The latter relates to the distribution of jurisdiction and competence issues among agents in order to design and implement legal norms and policies (i.e. international organizations and donors that encourage multilateral agreements and norms aimed at conservation and sustainable management of biodiversity; scientific arenas that generate knowledge about the SES and use that information to influence political decisions, among others).

This latter dimension clearly shows that the mechanisms and governance processes affecting a SES do not only come from the influence of the local agents but from other exogenous agents as well. No local agent is able to exert complete control neither over the whole set of local resources nor over what happens within a system. Therefore, since multiple internal and external agents come into play, each them with their own motivations and interests, discount rates when making decisions, sources of information, legitimacy and credibility as well as regulatory instruments, the interactions and degree of synergy between actors at different scales are critical for the governance of a rural SES (Young, 2006).

From this spatial perspective, vertical interrelations emerge as a construct on the interrelations between agents whose power, domain or competence over a certain scale differ. From a systemic perspective, these vertical interplays (either ascending or descending) help the system to evolve and endure.

5.1 Dynamics between micro-macro levels: the dilemmas of bottom-up and top-down processes

Any attempt to visualize 'scale issues' for social interactions can be referred to the proposal made by Woolcock (1998), who developed the ideas of embeddedness and autonomy within social interactions as a source of social capital (Granovetter, 1985; Coleman, 1988; Putnam, 1993). Based on the dimensions of social capital located both in micro-macro levels of a society (integration / linkage at micro level; organizational integrity / synergy at macro level), a taxonomy of developmental states was proposed. Such developmental states reflect, at the micro level, the degree to which social interactions combine cohesion between individuals and linkages with other agents at a higher level. At the macro level, the institutional framework is emphasized through the cohesive action of public bodies and their relations with civil society at a lower level.

In terms of vertical interactions, these ascending and descending processes each have different associated meanings. At the micro level, the linkages with other groups provide access to resources (ascending) that may be needed to innovate within horizontal relations. At the macro level, the extent of interrelations between government and civil society demands public bodies to provide deliberation spaces (descending) so that collectivities can use their agency.

Two considerations can be made. First, both ascending and descending processes must co-exist (Woolcock, 1998). This co-existence allows individuals to generate and use their social capital. The mix of horizontal and vertical dimensions must be adapted to the circumstances. That is, the required mix of social interrelations to produce social capital is context-specific. Given a changing context, there is neither an optimal nor a stable mix of dimensions to produce social capital. Thereby this combination must be conceived as dynamic and dimensions be prioritized in accordance to the circumstances.

The second consideration deals with the accessibility of the potential benefits of social capital. The idea of social capital relies on the externalities generated by social interactions, be they horizontal or vertical. According to the social capital literature, all these externalities represent a highly valuable set of intangible assets (power, knowledge, authority, influence) that may be critical for the livelihoods of any individual (Collier, 1998; Bastiaensen et al., 2002). Yet the accumulation of this potential does not mean that the benefits will automatically be accessible to and enjoyed by the holder. Considering the externalities as 'political resources' or 'instrumental political capital' (Birner and Wittmer, 2000), they will need to be deliberately and consciously used (activation) to provide their benefits (i.e. to help the individual achieving their goals or attaining new assets). Unless the holder uses this set of intangible assets, its value will be null and the potential will remain latent, and when not used it will steadily erode and depreciate.

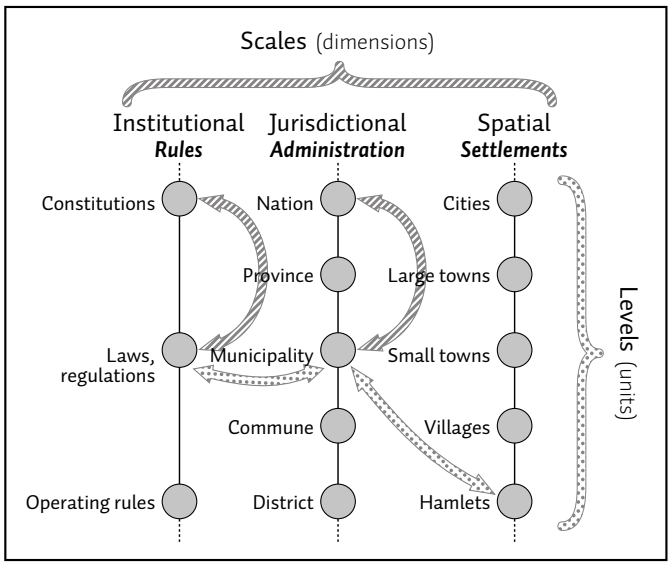
In short, these vertical interplays may be referred to as ascending processes, by which agents can access necessary resources for innovation as well as activate the available potentialities (among others, those provided by social capital), and descending processes, which provide spaces to allow agents at the micro-level to influence the definition of policies and activate their accumulated potentialities.

5.2 Scale challenges and vertical interplays

In order to introduce the complexity perspective on the vertical interplays, some previous concepts are needed (see Figure 10). Scale refers to the spatial or time-based, quantitative or analytical dimension used to measure and study any phenomenon (jurisdictional scale, spatial scale, institutional scale, population scale). Level refers to the units of analysis located in different positions of a given scale. For example, a jurisdictional scale can be divided into administrative units (from district councils, local government up to supranational level); a spatial scale into areas units (from patches up to regions, continents); a population scale into agglomerations units (households, blocks, districts up to nations level). Cross-level or intra-scalar interactions emerge as interplays within a given scale between agents located at different levels (i.e., interplay between local government and sectoral ministries within the jurisdictional scale), and cross-scale or inter-scalar interactions as interplays between different scales, as those existing between population and jurisdictional scales. Vertical interplays refer to intra-scalar interactions between agents located at different levels of a given scale, be they adjacent or not. A single agent can also be positioned in more than one level within a scale (multi-level presence) or in more than one scale (multi-scale presence) (Cash et al., 2006; Young, 2006; Gibson et al., 2000).

Within a SES there is a wide multiplicity of interrelations among individuals and organizations. The intensity and direction of these interplays may change over time. Influencing factors are the differences in power and authority between stakeholders, the transfer of authority and resources towards lower levels of the scale (decentralization), the mental constraints to devise new interplay modalities, or the existence of blocking vs. encouraging coalitions of stakeholders (Young, 2006). Depending on the nature of these interrelations, they will be characterized by patterns of dominance, separation, coalition or negotiated agreements among the stakeholders. Each of these patterns has a different impact over the different dimensions of the resilience of the system. Just as the nature of the interplay (intensity, direction, length) changes, so does its impact on the resilience.

Figure 10: Scales, levels and vertical interplays



: cross-level (or intra-scalar) interactions. : cross-scale (or inter-scalar) interactions.

A scale challenge refers to those cross-scale and cross-level interplays, which threaten to undermine the resilience of the system. These challenges may occur when the agents fail to recognize important scale and level interactions altogether (ignorance); or when the human action and ecological systems mismatch and discrepancies between the knowledge of the system and the appropriate scale for decision-making appear as a consequence (Cumming et al., 2006). Finally, a scale challenge also appears when one single 'correct' scale dominates and is supposed to be representative of the system as a whole. This situation may be due to the inability of agents to perceive the heterogeneity and multiplicity of scales that are impacting on the evolution of the system (Cash et al., 2006; Ferreyra et al., 2008).

Vertical interplays involve political issues as well. The extent and intensity of any given vertical interrelation also depends on the benefits attainable for the agents involved. The persistence and stability of any governance architecture will greatly rely on the distribution of benefits in these vertical interactions (Adger et al., 2006). Just as some interactions may reinforce imbalances among stakeholders and others may modify the political arena, these interplays generate winners and losers. Thus, those who participate and the conditions of their participation also determine the structure of the interplay, in accordance with the relative balance of power of the stakeholders and the costs to get involved in such linkages. The greater the power differences among stakeholders, the more imbalanced any interplay and the more negative the effect over the resilience of the system will be.

Provided a multiplicity of responses, interplays and agents, an optimal mix of interplays to avoid 'scale challenges' is almost impossible to design. Nevertheless, at least three basic modalities appear to be recurrent (Cash et al., 2006). A first type is the institutional interplay, built among different management systems at different levels within the same jurisdictional scale. A second type is co-management, defined as a continuum of agreements based on distribution of power and responsibility. The ability of adaptation, the self-organization and the 'learning by doing' that emerge from this type of interplays are considered factors for success to manage 'scale challenges'. Finally, a third type is the emergence of boundary-bridging organizations. Given a context of interplays among collectivities and organizations with different or even opposed interests, some 'boundary-bridging organization' may emerge and mediate in order to build shared perceptions and knowledge.

These previous considerations provide new insights into the scale and vertical interplays in a SES. Multiple levels of governance (multi-layered governance) and external sources of change are pervasive issues to manage the resilience in a SES. In order to make further progress, scale issues will be added to the metaphor of 'adaptive cycle', giving rise to a new metaphor: the 'panarchy'.

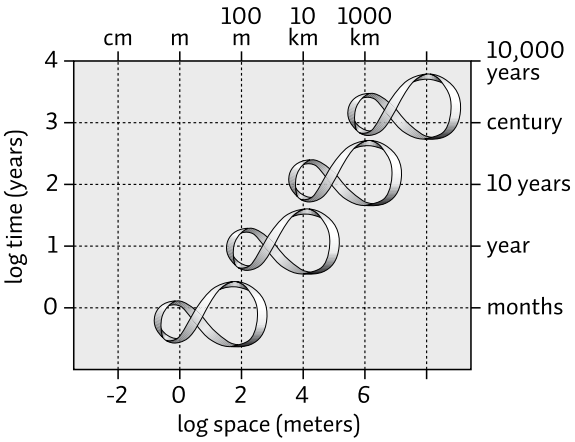
5.3 Panarchies as a dynamic and multilevel construct with respect to social-ecological systems

The 'complex system' is a static concept. Dynamic considerations have been added by means of the 'adaptive cycles'. A spatial dimension is now required in order to recognize the existence of adaptive cycles at different scales and levels as well as their interrelations. The concept of 'panarchy' arises.

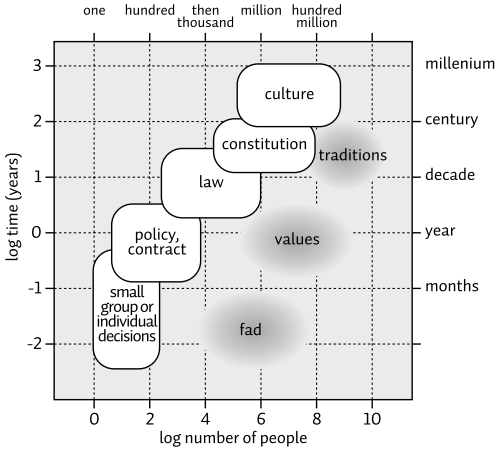
Panarchy[1] stems from the Greek term pánarkos ('that governs everyone') and is applied to the hierarchical representation of an entwined set of adaptive cycles (Holling, 2001; Holling and Gunderson, 2001). When applied to a panarchy, 'hierarchy' refers to a set of semi-autonomous cycles that are mutually influential and share some spatial attributes, while they are located on different levels and evolve at different speeds. Figure 11(a) and 11(b) show two ideal-type representations of a panarchy.

Figure 11: Representations of panarchies

(a) Ideal representation



(b) Panarchy of social norms



SOURCE: Holling (2001).

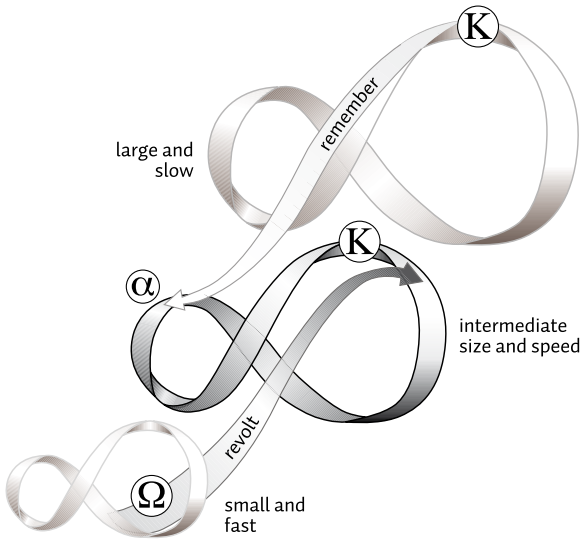
Figure 11(a) represents the spatial dimension of the panarchy on the X-axis and the temporal dimension on the Y-axis. Upper levels of the panarchy are integrated by slower and broader adaptive cycles (every cycle takes between centuries and 10,000 years time and its influence spreads over 1,000 m), while lower levels contain faster and narrower adaptive cycles (length measured in months and affects smaller areas of influence); e.g. within the panarchy of a society, a household is a complex system located in the lower level, while in upper levels are the district council, the city hall, the province government, national government and so on.

In other terms, a panarchy of the rules of a society can be represented as shown in Figure 11(b). In the lower levels are represented the decisions of individuals and small collectivities of a society. These decisions affect a limited number of persons and are taken almost continuously. Climbing up the hierarchy of cycles, more elaborated norms arise (contracts, policies, laws, constitutions). Such institutions affect a greater amount of individuals and take longer to consolidate and be modified. On the top are the traditions and culture of a society, whose temporal scale is measured in terms of centuries.

Within the panarchy, every level acquires a sense, not only by itself but mostly through the connections with other levels. When stages of an adaptive cycle change, two interactions between panarchy levels are of special interest: the 'revolt' and the 'remembrance' interaction (Figure 12).

[1] The Greek suffix pan- means a whole, a totality. In the context of 'complex systems' studies, it is used as an analogy with the Greek god Pan, symbol of unforeseeable change (Holling, 2001).

Figure 12: 'Remembrance' and 'revolt' interactions among levels within a panarchy



SOURCE: Holling (2001).

When an adaptive cycle enters into the stage OMEGA, the consequent collapse can spread over an upper level. This contagion situation will likely occur if this upper and slower level is going through a stage K, then showing the lowest resilience and the highest vulnerability. The revolt effect refers to sudden events (on a small scale) that overcome the capacity at the immediate superior level in the panarchy to integrate them as an innovation into the 'forward dynamic'; that is, when the upper level has accumulated rigidities and vulnerabilities.

Another relevant interaction between panarchy levels is remembrance. At the beginning of a stage ALPHA, once the crisis is over, opportunities and constraints to re-configure the adaptive cycle are strongly influenced by stage K at an upper and lower level. This interaction emerges by the influence of previous knowledge and accumulated experiences that remain institutionalized in every upper level of the panarchy.

The insertion within a panarchy provides an adaptive cycle with invigorating sources of change from the lower levels and with references for innovating from the upper levels. Therefore, a panarchy renews by means of the smaller and faster adaptive cycles in the lower-levels as well as stabilizes by the influence exerted from larger and slower adaptive cycles in the upper levels.

5.4 Implications for rural territories

The discussion on vertical interplays and the panarchy construct has, at least, three implications.

The first one refers to the ability of local actors to establish links with networks of people and flows of information and goods outside the territorial system. Connectivity in rural areas turns into a critical issue. For productive transformation in rural areas to be effective, local entrepreneurs will need access to external sources of innovation, information and to new market linkages (Marchante et al., 2007). Firms in remote and peripheral areas face higher production and transaction costs (Redding et al., 2003). The dissemination of socio-economic and cultural

patterns between urban and rural areas greatly relies upon transport and communication facilities, which allow more intense flows of resources between urban and rural areas (Entrena Durán, 2006).

Another consideration brings the political economy issue into discussion. Rural territories are ever more affected by decisions made outside of their boundaries: WTO negotiations, trade preferences in developed markets, ODA resources, migration quotas, regional integration schemes, changes in political regimes, civil conflicts. While some of these changes may exceed the scope of influence of the local agents, in others territorial advocacy may be relevant. The ability to introduce local agendas within policy processes outside the local system is essential to manage the panarchy dimension of resilience (Hamin and Marcucci, 2008). From a political standpoint, rural territory can be conceived as a development space that contributes to integrating citizens into the public domain (Navarro Yáñez, 2008). A greater engagement of local actors in public issues improves adaptation of policies to local needs and enhances democratic governance (Stoker, 1998). Civic engagement and social interactions contribute to develop the community agency (Ballet et al., 2007; Brennan and Luloff, 2007; Cleaver, 2007). But given that social and civic development of the community is not a primary objective of this new rural policy (Shortall, 2004), some skills and transaction costs (learning costs) have to be assumed. Collectivities need agency ability, leadership and organizational skills (Krishna, 2001). When dealing with political issues (i.e. defence of civil and social rights, participation in formal political arenas), the context in which the agents operate becomes critical in order to activate this potential (Meier et al., 2004). Therefore, structural variables of the political system, i.e. the 'structural political capital' (Birner and Wittmer, 2000), co-determine the options available for individuals to accumulate and activate their instrumental political capital and make the most of the vertical interplays.

As a consequence of the latter, the final consideration is related to the implications of the structural political capital for the vertical interplays. In the panarchy construct, the upper levels are recognized to play a 'remembrance function'. But they also have an important role to play in creating new lower levels in the panarchy and facilitating vertical interplays. From this systemic perspective, political devolution has a fundamental purpose. Based on a 'subsidiarity principle', this transfer of resources and powers creates new lower levels within the panarchy. Spaces are also opened to engage new interest groups from these lower levels in the policy-making and in the definition of priorities of the upper levels (Eising, 2004). Increasing the stakeholders' engagement in the policy process facilitates interplays between upper and lower levels of these panarchies (Voets and De Rynck, 2006; Walti, 2004; Duncan and Christopher, 2007). The 'multi-level governance' developed in the European Union is an empirical evidence of this (Marks et al., 1996; Hooghe and Marks, 2001). In the EU case, this institutional mechanism relies upon the transfer of sovereignty from the member states to the EU institutions and a greater engagement of the lower tiers of government administrations (regional, local). This multi-level approach stands far from hierarchical top-down policy-making. It relies on open methods to generate and disseminate knowledge across different tiers of administration for the design of new public policies (Kayser and Prange, 2004; Kerber and Eckardt, 2007). This policy approach has demonstrated to be effective in dealing with environmental issues (Gustavsson et al., 2009; Newig and Fritsch, 2009) and with regional policy (Percoco and Giove, 2009), by providing a greater engagement of the local actors (Berkes, 2007a) and by encouraging horizontal coordination among local administrations from different countries (Kern et al., 2009).

6. Agents: Governing resilience in a social-ecological system

The resilience of a social system challenges, first and foremost, the governance of the human subsystem. Avoiding a SES to move towards 'trap-states' relies on the action exerted by the human agents to transit to new states of stability. Resilience management also relates to the ability of these agents to make the system remain in a desirable basin of attraction and thus avoid crossing the boundaries into any undesirable basin. Both actions can be carried out by actively driving the system across the thresholds, making a threshold cross the system or changing the basin of attraction.

An institutional approach to deal with this transition to new states of stability would emphasize the design of governance mechanisms. The principles[1] proposed by Ostrom (1990) to manage common-pool resources stress the influence of the stakeholders when establishing the agreement and defining the operational rules. Institutions are robust or balanced in accordance to the ability of the stakeholders to react and undertake modifications in the agreement whenever facing foreseeable changes in the conditions of the system. Nevertheless, this proposal fails to deal with, at least, three fundamental questions. First, such an approach may lead to an almost exclusive focus on bureaucratic issues (design principles, operational norms) of the process of institutional change and thus make the mechanic transfer of "universal" organizational criteria to institutionally deficient contexts mistakenly look like a feasible and straightforward option. In line with the perspective of complexity theory, Cleaver (2002) however convincingly argued that any such attempt will inevitably be articulated with and transformed by previously existing institutions. Second, the interpretation of 'robust' or 'resilient' institutions may be insufficient as the reaction ability is limited to foreseeable changes in the conditions of the system. Finally, this proposal does not include how the system should behave and which change processes should be undertaken by its stakeholders when facing situations that modify its state of stability (Anderies et al., 2004). Since a general and stable equilibrium is not a real assumption to explain the dynamics in a SES, a static perspective is not appropriate to govern this kind of systems either. A dynamic approach in line with the 'institutional bricolage' idea proposed by Cleaver (2002) is needed.

Recent advances include an understanding of social processes as social learning and social memory, mental models and knowledge system integration, visioning and scenario building, leadership, agents and actor groups, social networks, institutional and organizational inertia and change, adaptive capacity, transformability and systems of adaptive governance that allow for management of essential ecosystem services (Folke, 2006)

6.1 Adaptive governance

Resilience of the SES heavily relies on the social subsystem. A resilient SES demands agents able to adapt structures and processes, in particular, by impelling changes on the inter-

[1] According to Ostrom (1990) the sustainable management of common-pool resources requires an institutional design based on some basic principles: the relevance of the definition and protection of rights (well-defined property rights, recognition of the right to association); endogenously-defined rules of the agreement related to the ***establishment*** (consistency between acquisition & provision rules and local conditions), ***operation*** (monitoring, gradual sanctions, mechanisms for conflict resolution) and ***modification*** (collectively-designed agreements) of the agreement; and the existence of vertical interrelations (intertwined enterprises located in networks upper-level system).

action rules which directly affects the governance of the social system. These rules condition the political arenas for decision-making, how the gains and the costs are distributed, who are to be considered as stakeholders, among other issues. From a systemic perspective, some issues have already been pointed out: self-organization (ability to cope with uncertainty; identification of thresholds and timely detection of crisis) and access to decision-making centres outside the system. All these mechanisms shape adaptive governance: the set of flexible governance mechanisms needed to facilitate dynamic management of resilience.

6.1.1 Basic propositions to build an adaptive governance

To identify what kind of mechanisms may be helpful to build and strengthen adaptive governance, Lebel et al. (2006) provide some fundamental propositions. The first one refers to participation and deliberation, as sources of trust and mutual understanding that facilitate mobilization and self-organization of agents. Participation makes a diversity of interests and opinions visible and facilitates the interplay among agents; deliberation allows them to exchange knowledge and information (without the necessity of reaching a consensus). Trust and mutual understanding are conceived as foundations for autonomous mobilization of the agents when they face perturbations or shocks.

The second proposition adds the scalar and vertical interplays issue: polycentric and multi-scalar institutions. Establishing a network of semi-autonomous nodes across the SES improves the overall knowledge about what is happening in the system. This network increases the awareness of potential sources of change. Likewise, it facilitates a closer monitoring and place-located (in situ) feedbacks and helps design more appropriate incentives for every context. Nevertheless, the multiplicity of these overlapping centres (as they might correspond to different scales) generates dilemmas in terms of efficiency and flexibility.

The last proposition demands accountable and just authorities. Public authorities may have a great influence on adaptive governance (Hodge, 2007). Their regulatory and normative competences let them exert the power to equitably distribute gains and losses generated by the system. The authorities should inform and explain poor performances as well as accept to be questioned by collectivities excluded from the gains or affected by the losses. In doing so, they help improve the resilience of SES by reducing social conflicts and strengthening the linkages between the weakest groups and the rest of the social system.

6.1.2 Critical implications of the propositions

These propositions produce, at least, three topics of special interest. One of the main challenges for the adaptive governance is the management of uncertainty and change. This management requires multi-scalar institutional agreements, conceived as semi-autonomous, intertwined centres of decision-making that are located at different levels and scales of the panarchy. Such agreements connect individuals, organizations, and public bodies, among other agents. As they maintain this multi-level nature, they are positioned at the crossing between top-down and bottom-up processes, upper and lower levels of the panarchy. By transferring information between levels and scales, they become critical mechanisms to reduce uncertainty.

A second issue refers to hysteretic nature of the processes at stake. The adaptation process highlights that some variables within the social system are path dependent in nature. The required investment to modify some of the 'slow changing variables' (prejudices, trust generation, effective leaderships, authorities that are committed to justice and prepared to face questionings) might indeed be extraordinarily high. Local agents might then be discouraged to get involved in such a process, as the expected returns exceed the time and space scale of their own generation.

The third issue is related to the role of the state. In some ways, the assumption of just and accountable authorities puts the state close to the idea of an institutionalized structure of collective action aimed at the general interest of society (Hoff et al., 1993), by emphasizing its 'distributional role'. This characterization is far from being real in many social systems due to the risks of capture and predation. That makes such a distributive role questionable in practice. Accountability and responsiveness of the decision maker should not be taken for granted either (Papadopoulos, 2003). Some institutionalist policy proposals also emphasize the contribution of the state to economic growth (to the generation of potentiality in its widest sense) as far as it secures and protects well-defined property rights, impartial enforcement of rules and norms and the absence of predation (North, 1990; Olson, 2000). Should the public authorities fail to provide such security and protection, individuals will have to seize resources to protect their property rights or to enforce their exchanges. The more relevant the political decisions, the more resources will be seized from productive uses and devoted to rent seeking. Since decentralization processes reinforce the risk of elite capture (Bardhan and Mookerjee, 1999; Johnson, 2001; Bardhan, 2002), rent seeking might even be more common at the lower levels of the panarchy (Fritzen, 2007). Any attempt to set up an adaptive governance should thus carefully examine to what extent governments and elites self-restrain their exercise of power and how more encompassing organizations can be given more effective weight in decision-making (Olson, 1984, 2000; North et al., 2002).

6.2 Dynamic management of resilience: adaptation

We have so far emphasized the adaptation within a SES to pass into new states of stability. The action exerted by the involved agents (users, politicians, scientists, entrepreneurs, farmers) is critical to identify eventual problems and provide solutions. Adaptive governance (based on participation and deliberation, polycentric and multi-scalar institutions and accountable and just authorities) appears as a tool that may help the system cope with perturbations.

The foregoing argumentation implicitly assumes a 'passive role' of agents in the management of the resilience of the system: i.e. reacting once the perturbation happens. However, once the shock occurs, the degrees of freedom for the stakeholders to cope with adaptation are quite limited and further diminish as time goes by. Therefore a key question is the ability of the agents to foresee the social and ecological perturbation and get prepared (Berkes, 2007b).

Forecasting has traditionally built on stochastic methods and decision analysis, in which uncertainty has often been underestimated (Bradshaw & Borchers, 2000). Other limitations for such approaches are the lack of knowledge about the probability function for given uncertain facts; the heterogeneity and ignorance about the utility functions of decision-makers; the difficulties to introduce changes into the decision models of individuals; and the assumption

that policies are designed in accordance to optimality criteria, when they are indeed a result of "rash and pragmatic interplays" among agents (Walker et al., 2002). Due to the features of an SES, a different approach might be necessary.

6.2.1 Creative thinking and cognitive synergies

According to its nature, an SES may have thresholds and exhibit irreversible changes. Scale challenges showed that stakeholders of a SES have to make decisions under conditions of imperfect knowledge and limited resources. Given these limitations, an alternative approach for building forecasts relies on exercises of collective reflection aimed at stimulating 'creative thinking' over the future and designing a set of alternative scenarios.

This approach proposes the design of rules (incentives) aimed at influencing the behaviour of stakeholders, which in turn should drive the system towards a set of agreed states of stability. In broad lines, this exercise can be outlined in four basic phases: (a) the definition of the relevant features of the system; (b) the development of a set of desirable and feasible scenarios for the future; (c) a detailed assessment of key factors and processes that strengthen desired system resilience; and (d) the identification of governance implications in terms of policy design and management of the system (Godet, 2001; Walker et al., 2002). This approach is essential for any policy approach aiming to improve the governance of complex social systems (Blecic and Cecchini, 2008).

Two questions are crucial. In order to build a shared assessment of the system and the design of feasible alternatives for change, it is critical for the stakeholders' ability to carry out collective action. This 'cognitive synergy' (Boisier, 2003) or 'socially organized learning process' (Gertler and Wolfe, 2004) refers to a shared cognitive framework that links the available knowledge of the stakeholders and the possibilities for action within a SES. Building local relationships increases the adaptive capacity of people within a common territory (Brennan and Luloff, 2007), which has relevant impacts on the ability to innovate. In this interpretation, the building of 'resilient paths' depends critically upon a constructivist approach (Rist et al., 2006; Soliva, 2007; Vogel et al., 2007; Hamin and Marcucci, 2008; Soliva et al., 2008)

Language becomes a fundamental tool in order to socialize conceptual constructions and experiences as well as turning them into driving forces for change. Since large and heterogeneous groups handicap collective action (Olson, 1962), building such 'cognitive synergies' can be considered as a way of increasing the homogeneity in heterogeneous large groups, especially when a wide participation of stakeholders with diverging interests is encouraged (Beard and Dasgupta, 2006). Together with this constructive process of cognitive synergy, the identification and participation of key stakeholders is an additional and very relevant question. Their knowledge and mental models hold key information about the processes of the SES. The homogeneity within the group and the legitimacy of the constructed paths are highly sensitive to the involved stakeholders (Mahon, 2007; Meijering et al., 2007), to a balanced distribution between experts and local informants (Herbert-Cheshire and Higgins, 2004; Schöll and Binder, 2009) and to the representativeness of the stakeholders (Reed et al., 2009). Appropriate knowledge of the local institutional frameworks, of the social structure and of the agents better positioned to get involved as key informants is required.

6.3 Dynamic management of resilience: transformation

Sometimes a system can get trapped into certain states of stability. In such situations, the only way out of the trap demands not just adaptation but an outright transformation of the structures and key processes of the system. Adaptive governance remains a pillar to effectively undertake this process. Time is also a key issue and not only because of the path dependent variables. This transformation also requires looking forward to building new 'states of stability' as well as the ability to identify the critical window of opportunity.

Empirical studies on the transformability in social systems (Olsson et al., 2004, 2006) propose a set of three basic phases and a critical moment ('window of opportunity'). The initial phase is known as 'generating potential'. The building of knowledge and an increased access to new sources of information are required by reinforcing the presence in multi-sector networks as well as in new spaces, like polycentric institutional agreements. Leadership is needed to give the necessary direction and orientation to the available resources within the system. Before entering the second phase, it is necessary to identify a 'window of opportunity', a precise moment in time which offers the appropriate settings to valorize all the knowledge, contacts and positioning attained along the first phase. This setting refers to that moment in which different assessments of the problems reach similar results, the capacity to propose feasible solutions is available and the political moment to undertake the necessary actions is adequate (Kingdon, 1995; cited by Olsson et al., 2006). Once these three circumstances converge, the window of opportunity emerges and a policy shift may be generated.

When relevant stakeholders grasp such opportunity, a second phase begins. Its pathway cannot be foreseen but merely managed. Previous rules and social mechanisms are no longer valid, so that the ability to improvise and take advantage of forthcoming opportunities is critical. This change management in a SES can be fruitfully compared to the art of rafting, expressed by its metaphor of 'shooting the rapids' (Olsson et al., 2006) or 'riding the waves'. That situation requires stakeholders with agency ability to be present at different scales and levels, develop policy proposals and influence decision-making. The last phase builds upon the achievements attained earlier. Changed values and attained knowledge during the first phase must be reinforced and reverted to the local system. Polycentric agreements that were previously generated provide new opportunities to broaden the range of local influence. Exploring and 'navigating' new scales and levels within the panarchy is crucial.

6.3.1 Shadow networks and transformational leaderships

Two factors are essential for this transformation process: the emergence of 'shadow networks' and 'transformational leaderships' (Olsson et al., 2006).

The 'shadow networks' come up as outcomes of self-organization processes among collectivities and individuals impelled by social and ecological crises. Such networks offer opportunities to create new linkages and interplays that improve the ability to cope with uncertainty. They may take either a long time or just suddenly arise. Some of their basic features are:

- A willingness to experiment and provide alternative solutions to emergent problems by encouraging changes in the social perceptions and values. These networks make special efforts to identify and mobilize effective incentives.

- Legitimacy of their policy proposals based on their 'insistently-proclaimed' independence from the public bodies. This turns to be critical in situations where formal networks and planning processes fail.
- They show a special interest in guiding or taking part in mutual learning processes with other grassroots organizations and in creatively solving problems when facing scarce resources. This direct contact with the grassroots agents lets them accumulate highly valuable datasets of experiences and knowledge.

The 'transformational leaderships' are shaped by agents playing a key role in establishing shadow networks as well as helping to build adaptive governance. These key agents "exhibit a tendency to develop informal social groupings (…) are motivators, able to harness energy from group members (…) help clarify and allow challenge to social rules and practices and will recognize the needs of individuals, while appreciating the complexity of the whole within which members of the group are all interrelated. Leaders act locally while appreciating the impenetrable extent of global complexity" (Stacey, 1996; quoted by Flood, 1999: 251). They are strongly self-encouraged by the ability to create movement or change and leave behind the ideas of certainty and control to be able to learn from crises and create potential by promoting flexible behaviours (Shelton and Darling, 2003; Olmedo et al., 2005). Among other issues, these leaders:

- Influence the generation and integration of a wide multiplicity of ideas and solutions, which turn them into fundamental agents to encourage re-conceptualization of key topics within an agenda.
- They go through different levels and scales across the governance and politics panarchy and get to recognize and/or provoke the emergence of windows of opportunities.
- Finally, they also encourage and manage experiments in lower scales and introduction of innovations by combining access to networks and experiences as well as collective references from the past.

However, the appearance of these leaderships does not necessarily guarantee the emergence of adaptive governance, as their behaviour may be highly variable and unforeseeable. A 'transformational leadership' is highly responsive to an adaptive governance to the extent it achieves results in terms of the guidance of agents, the management of processes and an effective presence across multiple relevant levels and scales. The guidance of agents entails spearheading and promoting changes in the attitudes of local stakeholders. Useful means for that purpose are the building of shared visions, the fostering of cooperation, the creation of open spaces for the resolution of eventual conflicts as well as new channels of communication among the agents. A transformational leader has to be capable of dealing with conflicts to manage participative and deliberative processes (Leeuwis, 2000). The management of the process implies giving attention to the planning processes; distinguishing relevant actions in accordance with the stage of the adaptive cycle in which the system finds itself (expansive vs. recessive dynamics); keeping in mind a time horizon over at least three decades; and managing the actions, by monitoring and assessing the outputs from past interventions, encouraging reflection together with undertaking practical changes, as well as helping to identify the adaptive cycle stage and the thresholds of the system. Finally, the presence within a variety of levels and scales of the panarchy requires encouraging and ensuring flexible influence in institutions and politics; generating a persistent leadership that manages to position itself at different levels and remains alert for the need to be present in even more levels and scale of the panarchy.

7. Final reflections

During the last decades, rural policies have gradually integrated new issues to tackle the multiple challenges of poverty. Besides discussions about the effectiveness of policy content in terms of poverty impact or sector priorities, the delivery mode of aid has arisen as an essential question. Effectiveness happens to be closely related to institutional issues such as the coordination among different levels of the public administration, the transition from government to broader governance, the articulation and synergy of the rural sector policies and the coordination between rural actors. The territorial approach to rural development aligns with these concerns on effectiveness, by making local agents take on a more decisive responsibility for territorial change and providing a mechanism to create and drive the development pathway.

Yet academics and practitioners in the development field have long been influenced by 'social-engineering' approaches, assuming accuracy and comprehensiveness in planning to be the essence of successful projects. Complexity challenges this rationality by revealing how paradoxical and illogical our world might behave. One of the fundamental implications of the complexity perspective is that we will always have to deal with uncertainty. Rural areas are conceived as social and ecological systems whose behaviour shows an unpredictable yet bounded instability. Our capacity to make predictions about the system or to manage its resilience does not necessarily improve with more information. Changes in the system are to be built and managed rather than forecasted or planned. Acting and adapting upon envisaged future scenarios becomes a more useful tool. Systemic appreciation together with creativity, innovation and self-organization are crucial to design desired and feasible attractors and to drive the system towards those states. Being aware that systemic grasp is an ever-expanding activity (Flood, 1999), leaders should be those individuals capable of helping us improve our systemic knowledge, keep an ongoing learning process and manage uncertainty. These capacities are based on the ability to establish interrelations and arrangements that enhance knowledge of experiences in lower levels of the panarchy and with references in upper levels.

Unlike the idea of "a mythic community" (Agrawal et al., 1999), this systemic and institutional approach to the rural areas stands far from any idyllic and self-sufficient vision of homogeneous rural communities. By way of conclusion, we discuss four ideas in this respect:

Heterogeneity within rural territories

The partnership mechanism should enable the management of divergent and often contradictory visions of the desired and possible development pathways in the territory. The partnership is envisaged as a kind of 'boundary-bridging organisation', whose physiology includes dealing with conflicts, forging coalitions among stakeholders as well as add-ons, dismissals or interference from 'external' actors. There is no blueprint for the type of partnerships or formal institutional agreements that shape an adequate institutional physiology.

Under no circumstances should the condition of 'cognitive synergy' with respect to the need (if any), the purpose and the direction of a territorial change imply any restriction of individual autonomy. On the contrary, robust and sound territorial change requires ensuring for a diversity of people leeway to develop their preferred strategies to improve their livelihoods, while providing incentives to those actions conducive to foster sufficiently shared overall objectives.

Resilience as a subjective and political concept

The territorial rural development paradigm can be conceptualised as a policy approach that tries to engender and facilitate a 'transformability process' in a rural area. In terms of an adaptive cycle, it helps going through a 'reorganization' phase, when a re-definition of the 'state of stability' is needed and key variables and processes of the territorial system have to be re-defined and reconfigured.

Resilience is not an objective concept, since it is associated with the desired 'states of stability' for the territory and these are strongly linked to the realities of the people engaged in its definition. Besides this, resilience also has normative implications: what the territory is desired to become, what range of values in which variables will define the thresholds, how the pathway to drive the system will be designed and managed, what actions will be supported? Increased 'cognitive synergy' on these key defining variables is one of the expected outcomes of the local partnership. Therefore participation and shared decision-making are proposed as ways of engaging local collectivities in the transformation of the territory.

It is impossible to remove the political and context-specific considerations from any process of knowledge construction and negotiation of meanings and interpretations. By themselves, neither participation nor representativity can legitimate any final outcome. Consensus building entails exercises of negotiation among agents with different views. The key issue lies in the capacity of the local agents to draw those outputs from creative deliberations where the diversity of interests and opinions are respected and negative aspects of traditional behaviour challenged.

Space for pro-poor governance

This reflection leads to the inclusiveness issue and the actual chances to build pro-poor governance. Internal controllability benefits from connectedness, though no justice or equality implications can be derived from it. Adaptive governance emphasizes considerations on accountability and fair distribution of gains and losses. Yet the need for 'socially embedded institutions' may even reproduce existing social divisions (Cleaver, 2002) and the outcomes of the cognitive synergy may represent the views of vested interests, afterwards heavily, though not necessarily openly contested (Mosse, 2001). Thus inequalities can even deepen.

Participation and negotiation are both hysteretic processes. There are neither optimums nor static solutions. At the heart of the territorial rural development approach lays an opportunity to create new spaces to contest, negotiate and reshape social relations. A great deal of the success will rely on the capacity of local actors to assess the costs of inequalities for the resilience of their territory; namely, to what extent inequality might represent a rigidity that hinders change. In that case, finding the way out of this rigidity is a responsibility of local agents.

So even though the current experiences[1] certainly aim to respect the endogenous logics and practices of the diversity of local actors, this particular principle of institutional de-

[1] Like the LEADER program in Europe, PRODER in Spain, REGIONEN AKTIV in Germany or in other non-OECD countries, like EXPIDER program of the IADB in several Latin American countries, PRODERNOA and PRODERNEA in Argentina and PRONAF in Brazil.

sign for setting up the local territorial processes may not always offer the convenient entry point to spur beneficial emergent change. Capacity of the poor to participate in this governance structure rarely can be achieved as a result of one single project and may need "successive waves of advances and setbacks" (IFAD, 2009).

The vertical interplays

The territorial approach is in line with the idea of promoting development strategies specifically tailored to the conditions of different institutional environments at the local level. But the local perspective cannot be disconnected from the necessity of building broader and deeper linkages with activities and agents beyond the boundaries of the system. A fundamental implication is that autarkic solutions are no longer valid to impel changes in a rural territory. The relevance of the vertical interplays has not been sufficiently recognized in rural policies and traditional community approaches.

The territorial approach does not preclude other administrations (at the same or upper levels) from having a role in the governance of a territory. Where capacity is lacking, it remains the necessity of ensuring a minimum and appropriate delivery of basic services. There is obviously also a role for overall sector priorities and guidelines, leaving scope for local territories to adapt these general priorities and guidelines to their specific conditions. Through coordination and synergy, public agencies with presence and territorial competences over sector issues (agriculture, education, infrastructures, employment, sanitation, health, taxation) can also get engaged with the definition of priorities and future scenarios for the territory.

The latter often demands a 'subsidiarity principle' that allows more control of decision-making at the territorial level. Larger territorial autonomy, as pursued through devolution, locates decision-making closer to the local population. The transfer of resources and powers to the local public bodies represents an opportunity for them to take up a larger responsibility in territorial change.

From a political perspective, rural areas are affected by decisions taken far from the field. Local actors have to develop the capacity to make their voice present on those scales and levels where these decisions are made. In this respect, establishing arrangements with peers from other territories can considerably improve the agency ability of any partnership or local actor and increase the effectiveness of the vertical interplays.

Rural-urban linkages should not only be seen as ways of improving access to administrative and public services in urban nodes, which are not always available in rural areas. From an economic standpoint, these linkages are fundamental to develop back- and forward business opportunities beyond the rural territory itself. Limited resources and shortcomings in local markets might hamper innovative productive strategies. External markets provide triggers for economic changes within the territory. Exogenous demand can work as a driving-force for transformation, encourage innovation in economic activities and help diminish the tendency to lock-in into traditional activities.

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